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THE MADRAS

QUARTERLY JOURNAL

OF

MEDICAL SCIENCE.

EDITED BY

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THE MADRAS
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PART I.

ORIGINAL ESSAYS.

ART. I.—*Acute Inversion of the Uterus, and Death by Hæmorrhage.* By Surgeon-Major J. L. RANKING, Acting Garrison Surgeon, Trichinopoly.

CASES of complete inversion of the uterus after delivery are sufficiently rare to justify the record of every instance occurring in practice.

Dr. Ashwell, in his work on Diseases Peculiar to Women, (Edition of 1845) writes, "In many years private and consultation practice, I have only met with it twice, and in more than eight thousand labours occurring at the lying-in institute of St. George's Hospital, we have not had a single instance;" while Dr. Denman, in the *Dublin Quarterly Journal of Medical Science* for August of the present year, informs us that "out of *one hundred thousand** deliveries that took place at the Dublin Lying-in Hospital since its foundation, we have only a single instance of acute inversion of the uterus recorded." The infrequency of such cases is equalled only by the fatality which attends them, death in

* The italics are mine.

a large number of cases resulting from shock or hæmorrhage or both combined.

The accident is usually attributed to injudicious traction upon the cord in attempts to remove an adherent orretained placenta; but Dr. Tyler Smith has combated this view, and has advanced that it depends in all cases upon an active condition of the uterus itself, and is not generally to be laid to the charge of malpraxis as is usually held.

In the case I have to record, the accident is distinctly referred by the husband (a pensioned Medical subordinate) to injudicious attempts on the part of a native midwife to remove the placenta.

Case.

Mrs. ——— was delivered, at 2 P.M. of the 13th November 1865, of a living male child. The presentation was natural, and the labour an easy one. Almost immediately after delivery the native midwife is alleged to have been observed to be using more force than was justifiable in attempts to remove the placenta, "pulling violently at the cord, and directing the patient to strain and bear down forcibly." She was directed to desist, but almost before the order was given, the uterus was expelled, and alarming hæmorrhage set in. I was summoned, and within five minutes from the occurrence of the accident, was in attendance. I found the patient in articulo mortis, rapidly noticed that there was a perfect pool of blood beneath the bed, that the mattrass was saturated, and the patient lying in a pool of blood.

The uterus was lying between the thighs of the patient completely inverted, flaccid, and with the placenta adherent. Hæmorrhage had ceased. No immediate attempts at reduction appeared to me justifiable; attempts were made to rally the patient from impending death by syncope, by the administration of brandy. As Dr. Harper resided within a stone's throw almost of the house, I went over to him (leaving the patient in the care of her husband with directions to give brandy ad libitum) to ask him to return with me and decide in consultation, whether in the event of her rallying, the uterus should be reduced with the placenta attached, or whether it (the placenta) should be detached previous to reduction. I was only absent a very few minutes, but on my return with Dr. Harper, found the patient dead. She had expired, her husband said, as I

left the house and without the occurrence of any fresh hæmorrhage.

I have already remarked that the placenta was adherent, and I now determined that it required some force to detach it.

The points of interest for note in this case are, the immediate cause of death, and the cause of the accident.

Death clearly resulted from hæmorrhage. The pool of blood beneath and on the bed sufficiently established these facts, and satisfied me that the perilous condition in which I found the patient could not be attributed to "shock."

Had it not been for the evidences of alarming hæmorrhage, I should have at once proceeded to reduce the inverted organ—a proceeding which I considered under the circumstances, although undoubtedly the proper line of practice where the element of *shock* constitutes the principal danger to life, unjustifiable ; inasmuch as that the least additional hæmorrhage induced by the manipulative proceedings necessary to reduction, would have led to instant dissolution.

The sequel proved that the hæmorrhage which had already occurred precluded recovery.

In regard to the cause of the accident, the husband of the patient unhesitatingly attributed it to the injudicious attempt made by the midwife to remove the placenta ; measures which he was in the act almost of interdicting when the mischief was done. There may possibly have been that '*active*' condition of the uterus, which Dr. Tyler Smith considers sufficient to induce *per se* acute inversion after delivery, and that condition may have aided and abetted the midwife ; but I think we have in this case evidence that the accident resulted from "traction upon the cord;" and constitutes another instance of a valuable life being sacrificed to meddlesome midwifery.

ART. II.—*Acute Inversion of the Uterus.* By Surgeon W. N. CHIPPERFIELD, Acting Physician, General Hospital, Madras.

As I fully concur in the opinion given by Mr. Ranking, in the first paragraph of the foregoing paper, that the rarity of cases of complete inversion of the uterus after delivery justifies the record of every instance occurring in practice, I am led to publish the following case which occurred eleven years ago. It is the only case of acute inversion which I have witnessed.

I was called up one night in January, 1856, to see a woman who was said to be dying after delivery.

She was a delicate, weakly woman, and she had been delivered of her sixth or seventh child, about an hour before I was sent for. I found a Medical subordinate and a midwife in attendance, who informed me that the labour had been a severe one, that there had been much hæmorrhage, and that the placenta was retained. I was shown a considerable quantity of blood in a vessel, and I found the bed-clothes saturated; but the hæmorrhage had ceased before my arrival. The patient had a very rapid thready pulse, and sighing respiration, and was in a state of jactitation. Brandy was immediately given, and in order to ascertain the state of things locally, I gently took hold of the cord as a guide, and, without making the least traction, I introduced two fingers into the os uteri which was soft and flaccid, and I found a rounded hard tumour projecting from the upper and back part of the organ. Whilst endeavouring to pass the finger around this tumour to make out accurately what it was, my fingers were suddenly forced out and the entire uterus followed, forming a complete inversion which protruded beyond the vulva. Obtaining a light I examined the organ; there was no hæmorrhage; its surface was nearly dry and of a pale pink hue, and adhering to its left antero-lateral portion was a thin, dry, shrivelled placenta—certainly the smallest and most contracted placenta I ever saw. The lower margin—in the natural position, upper in its present position—of this placenta was slightly separated. Beginning at this point I gently peeled off the shrivelled mass; no hæmorrhage followed, and I immediately commenced the re-placement of

the uterus. This was effected without the least difficulty, by first indenting the fundus, which was now soft and relaxed, and then gently kneading the margins of the indentation. At first it ascended very gradually, but the final completion of the reduction was independent of my efforts, it was a sudden quick movement,—evidently the result of contraction of the fibres of the cervix.

The poor woman remained in an exhausted, restless condition, tossing wildly about. Brandy was assiduously given, but she died of exhaustion in a few hours.

There can be no doubt, that at the time I first saw the patient, she was in a most precarious state from post partum hæmorrhage, to which probably may be added the existence of that *introversion* which I detected upon examination, and which spontaneously became a complete inversion.

The case was reported to the Surgeon (now retired from the service) under whom I was doing duty, and, although nothing was said to me personally, I subsequently learnt, that in conversation with a medical friend, he had mentioned the case and delivered his opinion that the accident had occurred solely through my making violent traction on the cord, as he did not believe in the spontaneous occurrence of inversion. Of course, I could take no notice of this as it was related to me in confidence, but I was able to convince my friend, by reference to standard works, that the spontaneous occurrence of inversion was well recognized. I was scarcely prepared to hear an opinion that undue traction on the cord must be *the only cause* of such an accident, as not only did I remember, the instances of its spontaneous occurrence which my obstetric tutor, Dr. Waller, used to relate in his lectures, but I had by me printed authorities (as above mentioned) thoroughly satisfactory on this point.

It may be useful to give here some short extracts, from such obstetric works as are at my command just now, exhibiting the opinions of different authors on the causes of acute inversion of the uterus.

Denman.—Introduction to the Practice of Midwifery, 2nd Edition, 1801, Vol. II, page 351.

"With respect to the causes of inversion, it has generally been attributed, solely, to the force used in pulling by the *funis*, in order to bring away a retained *placenta*. But there is reason to believe, that the *uterus* has been inverted,

when on account of a hæmorrhage, or some other urgent symptom, the hand had been introduced into the *uterus* while in a collapsed or wholly uncontracted state, and the *placenta* being withdrawn before it was perfectly loosened, the *fundus* of the *uterus* has unexpectedly followed, and a complete inversion been occasioned. I have also been assured, that in some cases there has been a spontaneous inversion ; that the accident happened, at least, when no force, or none capable of producing the effect, had been used ; and then it was imputed to the shortness of the *funis*, giving the disposition before the birth of the child ; or to some untoward action of the *uterus*. But with this assurance, or explanation, I do not feel quite satisfied, because the degress of force must always be vaguely estimated; though if a disposition to an inversion be first given by the force used in pulling by the *funis*, it may be completed by the action of the *uterus* ; or, if the least possible degree of inversion were given by the shortened *funis*, it might certainly be completed by a very slight additional force in pulling by the *funis*."

Boivin and Duges.—A Practical Treatise on the Diseases of the Uterus and its Appendages. Translated by Heming. 1834, page 116.

" Previous distension of the uterus ought not to be considered as a real predisposition to inversion, except inasmuch as the uterus, entirely or nearly empty, retains a certain degree of softness, flaccidity, and inactivity, such as sometimes obtains after labour, and is denominated *inertia*. It is under such circumstances as these that efforts on the part of the patient, as for the expulsion of the placenta, may by the pressure of the intestines upon the fundus uteri, lead to depression in the first instance,* and afterwards, to inversion. M. Dailliez had adduced many examples in proof of this fact. Inversion will easily ensue, if the umbilical cord be hastily drawn, before the placenta is detached ; and violence has often completely inverted the flaccid uterus, which had previously presented no sign of depression.

" The same consequence may occur even under careful treatment. An irregular, partial contraction,—that, for instance, which occasions the *encystment* of the placenta, may

* " We have seen a case of depression occasioned by the sacro-vertebral angle of a deformed pelvis ; this was discovered on a post mortem examination."

circumscribe a flaccid portion, and force it inward, instead of strangulating it outwards. Astruc announced this in theory, and it has been borne out by experience."

Burns.—The Principles of Midwifery, 9th Edition, 1837, page 556.

"Inversion, in a great majority of instances, depends upon the midwife endeavouring to extract the placenta, by pulling the cord. Sometimes the uterus is directly pulled down and the placenta still adheres: in other cases, it is separated. It may also happen, if the child be allowed to be rapidly expelled, for, if the cord be short, or entangled about the child, the fundus may receive a sudden jerk, and become inverted. From the same cause, or, sometimes, perhaps, from sudden pressure of part of the intestines, on the fundus uteri, occasioned by strong contraction of the abdominal muscles, a part of the fundus becomes depressed like a cup, and encroaches on the uterine cavity. This generally rectifies itself, if let alone; but, if the cord be pulled, or if there be any tendency in the uterine action, to go towards the fundus, as happens when that part is lacerated, and may in like manner occur in the present case, the depression is speedily converted into perfect inversion, which may thus take place, spontaneously, and without any fault of the attendant."

Ashwell.—A Practical Treatise on the Diseases Peculiar to Women; 3rd edition, 1848, page 583.

"Of the *causes* some are intelligble enough. Hard or sudden traction on the umbilical cord, during a relaxed condition of the uterus, and a violent pulling away of the placenta by the hand before it is entirely separated, require no explanation. Dr. Davis dwells almost exclusively on a short cord, or the coiling of it around the neck of the child, as the great causes; but he is probably in error, as we do not find that inversion has followed in these cases, and in both instances of the disease which I have seen, the funis was of the usual length. There must be other causes beyond these mechanical ones; for the accident occurs spontaneously and after labours where there has been neither severity of pains, nor delay.

* * *

"There is probably prior to the inversion, a great change in the uterus; either sudden and violent contraction, or

instantaneous and complete relaxation ; or the first may be immediately succeeded by the latter state.

" It may then be safely inferred, that a quick labour, or any circumstance disturbing the natural progress of parturition, and inducing irregular and sudden contractions—the forcible use of instruments, mental excitement and alarm, and hæmorrhage resulting from attempts to remove the placenta, may all of them be regarded as so many causes of inversion. Capuron says, that dilatation of the os uteri, and atony and flaccidity of the uterine parietes, are the predisposing causes. The exciting causes are weight of the fundus, violent expulsive efforts, tractions by the funis, and the dragging of a polypus.

* * *

" Pulling at the cord, or withdrawing the hand from the uterine cavity, with the placenta only partially separated, and a short funis, are by no means the sole causes of inversion. I do not mean to deny that the uterus may be thus inverted ; but when it is remembered how often the funis has been short and the labour quick ; how many cases are recorded, several of which I have myself seen, where the child was precipitated and the cord suddenly snapped ; how often hasty practitioners and ignorant midwives have detached it from the placenta, and yet without inversion—it may not be improperly assumed, that this fearful accident has been too generally attributed to mechanical violence. Perhaps a cause more explanatory may be found in the operation of some concealed and ill-understood influence on the uterus itself immediately after labour, by which its functions become so deranged that contraction and relaxation of different portions of its structure simultaneously occur."

Simpson, Sir J. Y.—Obstetric Memoirs and Contributions ; 1855, page 817. From a Review of Dr. Radford's Obstetric Essays.

" Inversion of the uterus is an accident which is sometimes concealed by the practitioner, because it is an occurrence which is very generally, but very undeservedly, conceived both by the patient's friends, and by the medical man himself, to attach blame to his character. This feeling is apt to paralyze the energies of the surgeon, and to prevent him from immediately adopting those measures which are

necessary for the reduction of the inverted organ. It is this procrastination which is blameable, and not the accident itself, which is one, as Dr. Radford has shown, that may happen in the best hands, seeing that it sometimes depends not so much upon any practice which the surgeon may have adopted, as upon morbid actions taking place in the uterus over which he has no control.

"Most authors attribute inversion of the uterus to causes purely mechanical—such as pulling rudely and violently at the funis in order to remove the placenta. But that this is not always the origin of inversion, is evident from a number of circumstances. The accident has happened repeatedly when the cord was of the usual length, before any force has been applied to it. It has been found before the child was attempted to be separated by dividing the cord; and it has occurred when the cord has been so putrid as to break with the slightest effort. We might refer also to cases where it has happened when the process of parturition was left entirely to nature; and in support of the same view of the subject, Dr. Radford might have quoted the cases recorded by Boerner (Loder's Journal für Chirürgie, &c., vol. i., p. 519), and Klaatsch (Henke's Zeitschrift for 1826, vol. iii., p. 45), in which this inversion took place in instances where the child was expelled some hours after the death of the mother, and when there was no person present to interfere with the process. According to the prevalent idea above alluded to, of the mechanical origin of inversion of the uterus, it is believed that the uterus is in a state of relaxation and atony, so that it offers no resistance to any force applied through the medium of the funis. Dr. Radford, however, has shown, by the history of several cases which he has himself met with, and of others recorded by Cleghorn, Brown, Merriman, &c., that the fundus and body of the uterus, so far from being in a state of relaxation, are, generally, if not always, in a state of unnatural contraction, as evinced by the strong and violent uterine pains which are present, and by the firmness and hardness of the inverted viscus. At the same time, however, that the fundus and body of the uterus are in this state of unnatural excitement and action, the os uteri appears to be comparatively relaxed and dilatable, seeing that it offers no resistance to the protrusion of the tumour through it. In other words, it is evident, that the fundus

and os uteri are in directly opposite conditions : the former is in a state of violent contraction, the latter in a state of atonic relaxation, and this relative difference in these two parts of the organ is indispensably necessary, as Dr. Radford conceives, for the possibility of the occurrence of inversion. In other words, it arises, like the hour-glass contraction of the uterus, from an inequality in the time and degree of contraction of the different parts of the organ ; and in Herbin's Thesis on Incarcerated Placenta, Dr. Radford will find a case of this kind, highly illustrative of his views of the pathology of inversion, inasmuch as in the case alluded to, the portion of the uterus which formed the chamber retaining the placenta was, notwithstanding the bulk of its contents, so firmly contracted, that it passed through the very relaxed os uteri, and projected into the vagina.

"At the same time, while we freely confess that we believe Dr. Radford has proved that his explanation applies to the majority of cases of inversion of the uterus, we can easily conceive other instances in which, the whole uterus remaining uncontracted, a mechanical cause, such as strong traction at the cord of an adherent placenta, may lead to the same frightful accident, in the way pointed out by Spence, Clarke, Gooch, Gardien, and most of our other systematic writers on midwifery."

Churchill.—The Theory and Practice of Midwifery, 3rd Edition, 1855, page 531.

"Various causes are enumerated by authors, some of which are real, and some only fanciful. Most of them, however, are such as would act merely mechanically. It has been observed to follow very quick labours, especially if the patient be delivered standing, or if she make too violent efforts. It may occur spontaneously* after the labour has been completed quite naturally, and in these cases it has been attributed by Dr. Radford to atony of the uterus, or to active contraction of one part, with an atonic condition of another. Dr. Tyler Smith regards inversion as depending upon an irregularly active condition of the uterus, by which the fundus is first depressed, then carried downwards by the annular contraction of the uterus, and, finally, *completely* everted. Nauche considers the inactive state of the uterus, and some effort made by the patient, or by an attend-

* Waller's Edn. of Denman, p. 244—Note.

ant pulling the cord, as the principal causes.* Capuron enumerates, as *predisposing* causes, the development of the womb, the dilatation of its orifice, and the atony and flaccidity of its walls. The *exciting* causes may be the weight of the fundus, violent expulsive efforts, tractions by the funis, and the dragging downwards of a polypus.† Henkel attributes the accident to violent after-pains; Meissner to a bodily predisposition, owing to a laxity of fibre. Siebold says, that atony of the uterus, with a large pelvis, and the too rapid abstraction of the contents of the uterus, may expose the patient to inversion.‡ Boivin and Duges [see above.]

* * * * *

"It is very credible, that violence in extracting the placenta may be followed by inversion; or as Denman observes [see above]. * * * Forcibly pulling the funis, for the purpose of detaching the placenta, may, perhaps, under certain circumstances, give rise to the accident, but it is not a frequent cause. Shortness of the funis, or the shortening of it by coiling round the neck of the fœtus, has also been alleged, but, I believe, without any foundation. * * Inversion may occur quite unconnected with parturition."

Murphy.—Lectures on Parturition, 1852, p. 423.

"*The causes of inversion of the uterus* are most usually traceable to violence, although sometimes the accident happens spontaneously. *Pulling at the funis* improperly is, perhaps, the most frequent cause. The placenta being retained, an attempt is made to separate it by pulling the cord: at first, perhaps, gently, by and bye with more force, and at length, 'a long pull and a strong pull,' brings down the placenta and the fundus uteri completely beyond the vulva. * *

"*Shortness of the funis* is assigned as a cause producing inversion, but I believe this very rarely happens. * *

"*Spontaneous inversion* of the uterus sometimes happens. Mr. J. Clarkson relates an instructive case of this kind."

West.—Lectures on the Diseases of Women. Part I, 1856, p. 229.

"*Inversion of the uterus,* the turning of the organ inside out, is an accident clearly impossible in the natural condi-

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* Mal. Prop. aux Femmes, vol. i, p. 131.
† Mal. des Femmes, p. 495.
‡ Handbuch der Frauerzimmerkrankheiten, vol. iii., p. 365."

tion of the unimpregnated womb; it being obviously essential for its occurrence that the organ should have attained a certain size, and that its walls should be comparatively yielding. It is indeed only at an advanced period of pregnancy that these conditions are generally met with, and only during labour that an exciting cause is likely to be superadded, capable of producing the misplacement; but at the same time, violent traction at the funis by some unskilled practitioner, before the detachment of the placenta, may mechanically invert the womb, or the organ may by its own contractions invert itself, just as the intestine does in cases of intussusception."

If my memory serves me correctly, Dr. West, in a subsequent edition of his lectures, has expressed himself more fully and strongly as to the uterus spontaneously inverting itself by its own contractions. The edition from which I have quoted is the only one I have by me now.

In the *Medical Times and Gazette* for October 27, 1860, there is an extract from the *Monatsschrift für Gebürtskunde*, in which several cases of Inversion of the Uterus are related. Dr. Brandt relates two cases to the Berlin Obstetrical Society. He states that although it was the interest of the midwives to hasten the termination of the labour, he had no proof that they had acted improperly. Professor Martin also referred to two cases, in one of which the inversion seemed to have been produced by traction on the cord made by the midwife. In the other case, the cause was doubtful. Dr. Mayer referred to two cases in which he was certain the occurrence was not produced by any external means, as he was present at the labours; and the expulsion of the placenta was left to nature. He referred likewise to a third case which had been also spontaneously produced.

Dr. Ebert stated that while engaged a few years ago in the compilation of a large work on inversion of the uterus, he could not find a single case recorded in which its production in consequence of a tumour could be regarded as indubitable. He believed, however, that it was possible an incomplete inversion occurring after delivery, might easily be overlooked, and become with the progress of time developed into a complete one. Professor Virchow had great doubts as to the possibility of the spontaneous production of inversion. In doubtful cases, he is, therefore, inclined to the opinion that the incomplete inversion produced after delivery, has

increased at a later period until complete inversion has been the result.

It will be noticed that both Dr. Ebert and Professor Virchow were referring to cases of so-called *chronic* inversion of the womb.

Dr. Kristeller referred to the case related by Baudelocque, in which inversion occurred in a girl eighteen years of age, whose hymen was unruptured, as a proof that the accident may arise independent of parturition.

I am not here making the slightest attempt at collecting recorded cases in proof of the proposition, that injudicious interference or violence on the part of the attendant is by no means the only, or even the most frequent, cause of acute inversion of the uterus, but I have just referred to the New Sydenham Society's Year Books of Medicine and Surgery, and I find at page 371 of that for 1859, and at page 370 of that for 1862, some details of cases of recent inversion, showing very clearly that the accident was of a spontaneous nature.

As regards the case I have related, I am perfectly satisfied that the degree of force was not vaguely estimated, as Denman says it may be, simply because there was not the slightest force used ; no traction whatever was made on the cord. I am further satisfied that, at the time I examined, there existed a depression, or introversion, or partial inversion of the fundus.

It is just possible, that the presence of my fingers may have excited that contraction which led to the ultimate complete inversion ; but my own opinion is that such was not the case, but that the accident was solely of spontaneous origin.

In regard to the treatment, authors differ as to whether it is better to separate or to leave the placenta before replacing the organ, but I believe the general opinion is, that if there is no hæmorrhage, and the placenta is partially detached, the separation should be completed before the uterus is reposited.

ART. III.—*Descriptions and figures of Five New Snakes from the Madras Presidency.* By Captain R. H. BEDDOME.

[*In continuation of Art. IV, Vol. IX, Page* 207.]

Plectrurus? trilineatus.—Snout rounded, not conical; cleft of mouth deep; eye large, pupil round; rostral slightly produced back, nasal forming a suture behind the rostral; supra-orbital shield present and a post-ocular shield distinct from the eye; one large temporal shield; no median groove along the chin; scales in 15 rows; posterior portion of the tail much compressed, some of the last scales very inconspicuously 2-3 keeled, terminal scale broad and ending in a small point, minutely tubercled above and with a deep grove below; body and belly of a bright brick-red color, with one dorsal and two lateral black punctated lines which extend from the neck to the end of the tail, the black dots each covering a scale; the lines are sometimes here and there interrupted by 1 to 3 consecutive scales being red, ventrals 165, anal bifid, subcaudals 15 pairs; total length 15 inches, circumference $\frac{3}{4}$ of an inch; the teeth are very conspicuous and gradually longer behind, there are about 8 in the upper jaw and 5 in the lower.

Anamallay forests; elevation 4,000 feet (Pl. I, Fig. 1. The 3 figures of the head considerably magnified). I have given a very full description, as this species differs in some points from the typical Plectrurus, and will perhaps have to be placed in a new genus.

Plectrurus sanguineus.—Tail compressed with the scales very obscurely keeled, terminal scale ending in a single sharp point; head elongated; rostral very small, nasals joined behind the rostral; frontals very large; vertical, 6-sided, diamond shaped; a supra-orbital and a post-ocular; one elongated temporal between 4th labial and occipitals; eye rather large, pupil elliptic, erect; no median groove along the chin; scales in 17 rows, abdominals 144, subcaudals 7 pair; color of back and sides dull black, belly red, here and there interrupted by black markings.

Anamallay forests; 4,000 feet elevation (Pl. I, Fig. 2. Coloured portion of the body life-size; figures of the head and tail magnified). The eye is much larger than in Plectrurus Perottetii, and instead of being in front of the ocular, it is as it were distinct; the supra-orbital is very large, and there is a large temporal shield, it seems nearly allied to the last species, but the tail is quite that of "Melanophidium."

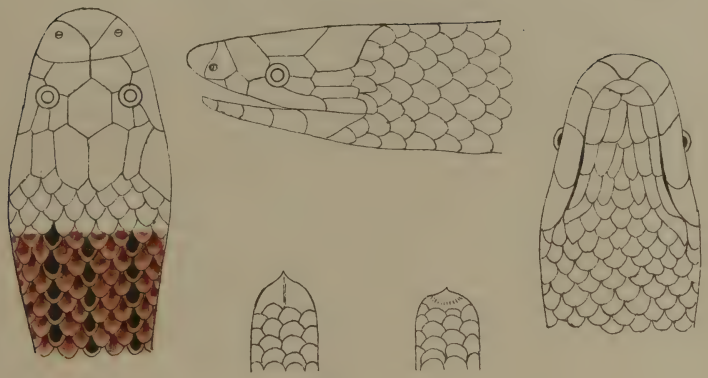

Fig: 1
PLECTRURUS TRILINEATUS
BEDD.

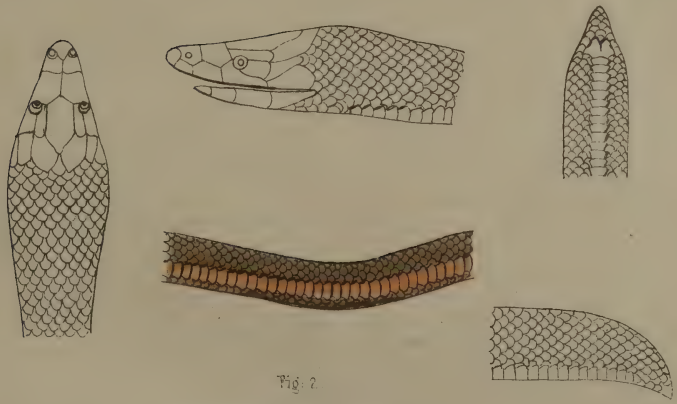

Fig: 2
PLECTRURUS SANGUINEUS
(BEDD,

Alex^r Barren. lithog. Madras. 1867.

Fig: 3.
SILYBURA RUBRO MACULATA
(BEDD.)

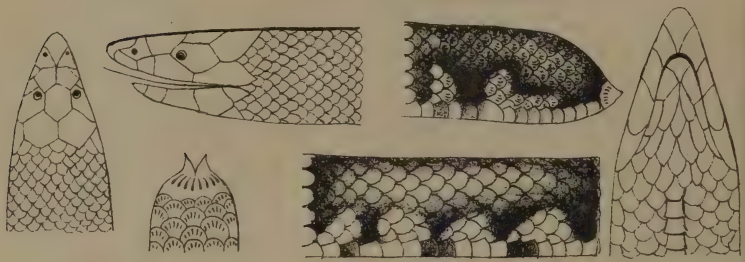

Fig: 4.
RHINOPHIS GRANDIS.
(BEDD.)

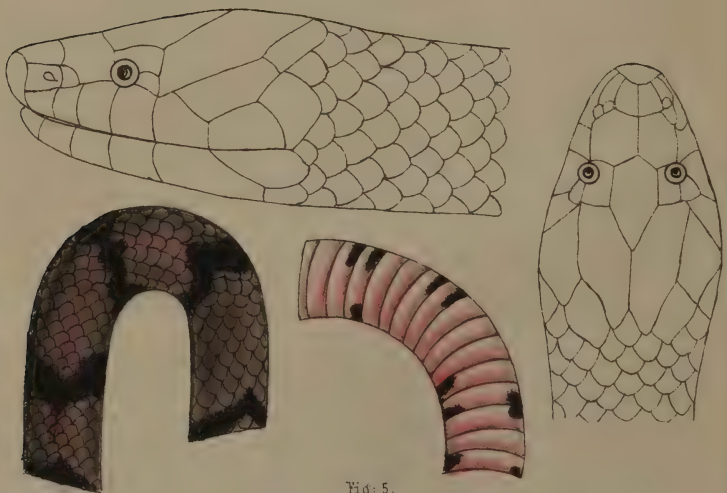

Fig: 5.
CALLOPHIS CERASINUS
(BEDD.)

Alex.r Barren. Lithog. Madras 1867

Silybura rubro-maculata.—Caudal disk well defined as if cut off with a knife, scales of the disk very prominently 2-keeled, terminal scale large, square at the end or very inconspicuously bi-cuspid ; abdominals 127, some of the last nearest the tail double, sub-caudals 8 pair, scales in 17 rows ; color brownish, a portion of each scale dull yellow, the yellow color predominating on the belly and sides, 5 red blotches along the sides on the anterior portion of the trunk, one on each side of the tail near the vent.

Anamallay forests ; 4,000 feet elevation (Pl. I, Fig. 3.) Nearly allied to S. Elliotii, but with quite a different coloration.

Rhinophis grandis.—Snout obtusely pointed ; rostral shield rather acute behind, produced back far between the nasals but not touching the frontals, from one-third to one-fourth the length of the head without any distinct keel ; caudal shield small, bi-cuspid, the points side by side ; trunk surrounded by 17 rows of scales, the anterior portion by 19 rows ; ventrals twice as large as the adjoining series, scales of the tail and a few of the last scales of the trunk near the vent furnished with 2-3 keels ; color of the back brownish black, belly yellowish, the yellow color rising in triangular markings which are alternate with similar markings of the color of the back, the dark coloring sometimes joining those of the other side, particularly in the anterior portion of the belly, and so forming transverse bands across the belly ; length up to 2 feet with a circumference of a man's thumb.

Anamallay forests in moist woods at 4,000 feet elevation, (Pl. I, Fig. 4.)

This is the largest earth snake (uropeltid) in our presidency. It is nearly allied to my Plecturus Pulneyensis (figured in plate 1, number xviii. of this Journal) which Dr. Günther the great Ophiologist has removed to Rhinophis, and this snake must belong to the same genus;—the head in both is that of Rhinophis, but the tail is very different to that of Rhinophis sanguineus.

I may here mention that Dr. Günther has made a new genus for my Plectrurus Wynadensis (Melanophidium.)

Callophis cerasinus.—Rostral slightly produced back between the anterior frontals ; anterior frontals only half the size of the posterior, the latter touch the orbit ; no loreal and *no anti-ocular;* nostril between 2 nasals ; 7 upper labials, 3rd, 4th, and 5th very high, 3rd and 4th enter the orbit ; 1 small

post-ocular ; vertical 6-sided, elongated, pointed behind ; superciliars small ; occipitals large, elongated, pointed behind, with a pair of large temporals on each side ; anal entire. Back purplish-brown with a shining nacreous lustre, with transverse broad irregular-shaped black bands extending to the tip of the tail (about 40) at nearly equal distances and which are continued (though not broad) underneath the belly and tail but do not quite meet ; sides (2 or 2½ of the lowest row of scales) and belly of a bright cherry color, head black in front, neck with the 5th, 6th and 7th labials and a portion of the occipitals cherry-colored. Length 21½ inches, of which the tail is 2 inches ; cirumference 1⅛ of an inch ; sub-caudals 31, abdominals 228.

Malabar forests—Wynaad, elevation 3,000 feet (Pl. II. Fig. 5. The 2 figures of the head magnified ; portions of the body life-size).

NOTE.—The following alterations should be made in the Nomenclature of my former Catalogues.

Callophis concinnus (Bedd.) (Vol. vi., page 45, Plate i., Fig. 2.) = Callophis Malabaricus (Jerd.) This species was also described by Dr. Günther, as C. nigrescens, but Jerdon's is a much older name ; it varies very much in its coloration. I have procured it on the Nilgiris and Shevaroys and in the Wynaad.

Rhabdosoma microcephalum (Vol. v. page 10,) (Geophis microcephalus of Dr. Günther's Reptiles of British India) is the Platypteryx Perroteti (Dum. et Bibr.)

Ablabes collaris (Vol. v., page 13) of my former catalogues differs from the true collaris and is A. Humberti (Günther) ; it is abundant in the Wynaad and in South Canara.

Spilotes vittatus (Vol. vi., page 43) is a Tropidonotus = T. Beddomii (Günther.)

Psammophis Indicus (Bedd.) (Vol. vi, page 45) = P. Condanarus (Blyth.)

Trimesurus strigatus (Gray) and T. Neilgherriensis (Jerd.) are one species = T. strigatus (Gray). (Vol. v., page 2.)

Trimesurus Malabaricus (Jerd.) = T. Anamallensis (Günther), but Jerdon's is the older name. (Vol. v., page 2.)

Trimesurus macrolepis (Bedd.) (Vol, v., page 2, plate 2, fig. 6) is placed in a new genus by Dr. Günther = Peltopelor macrolepis.

Tropidophis schitosus (Gray) (Vol. v., page 9) = Atretium schitosum. (Cope.)

Chersydrus annulatus (Gray) (Vol. v., page 7) = C. granulatus (Schneid.)

Cerberus cinereus (Gray) (Vol v., page 7) = C. rhynchops (Schneid.)

Hypsirhina Aor. (Wagl.) (Vol. v., page 9) = H. enhydris (Schneid.)

Calamaria Linnæi. (Vol. v., page 10) = Ablabes Humberti (Günther.)

Xenodon viridis (Dum. et Bib.) (Vol. v., page 14) = Tropidonotus plumbicolor. (Carst.)

Coryphodon Blumenbachii (Dum. et Bib.) (Vol. v., page 17) = Ptyas mucosus. (Cope.)

Dryiophis prasina (Vol. v., page 19) = Tragops dispar. (Günther.)

Dryiophis tropidococcyx (Günth.) (Vol. v., page 19) = Tropidococcyx Perroteti (Günth.)

Passerita mycterizans var. fuscus (Vol. v., page 19) = P. purpurescens (Günth.)

Eudipsas cynodon (Vol. v., page 20) = Dipsas Boops (Günth.)

Typhlops Russellii (Vol. v., page 27) = Onychocephalus acutus (Dum. et Bib.)

Argyrophis Bramicus (Vol. v., page 28) = Typhlops Braminus.

Art. IV.—*Special Report of an outbreak of Jail Diarrhœa, assuming a choleraic form, in the District Jail of Nellore, during the months of September and October* 1866. By E. E. Lloyd, Esq., Zillah Surgeon, Nellore.

(Communicated by the Principal Inspector General, Medical Dept.)

The prisoners in the Jail having enjoyed an unusual amount of health during the previous four or five months,—after recovering from a very severe type of diarrhœa on the introduction of raggee into their diet in the place of rice, which was put a stop to then, and has not since been resumed,—were, early in September, seized with another attack, which seemed gradually to take them, but soon put on a very serious type in many, assuming a choleraic form, though not true cholera, proving fatal to some of those who died in less than twelve hours, but many of them, from fear of going to hospital, not reporting themselves sick to the maistries or warders, had been suffering from diarrhœa for many hours, and consequently, when admitted, were found to be in a very bad state.

2. A gang, varying in number from five to eighty men, had been at work since early in July in clearing out a tank, and afterwards carting away the dry black soil taken therefrom, and this I consider to have been the cause of the outbreak, for the first few cases that were admitted into hospital occurred among those who had been so engaged.

3. Those attacked were of all ages, from 17 to 51 years, and mostly prisoners who had been but a short time in confinement.

4. Of the thirty-seven cases admitted, thirty-three were males and four females, of which eight of the former proved fatal and three of the latter.

5. In all, the symptoms varied; some were seized with vomiting and purging, some with purging without any vomiting;—the motions also varied, in most of them they were watery, with flocculi like half-digested grains of rice as sediment; in colour, some clear, some like dirty muddy water, others variously coloured from pale-yellow to dark-red, the latter, caused by the passing of blood;—in nearly all was abdominal pain, more or less severe, and cramps.

The pulse remained distinct in nearly every case, though in many very weak and just perceptible, in all quick. The temperature of the body also varied, in some there was an unnatural heat, in others it was much below. In a few there was suppression of urine, in the rest the urine was free; —in not one case was there real collapse; those which terminated fatally did so before collapse set in from exhaustion, increased in most cases from excessive pain in the abdomen which nothing seemed to check. In one case death was preceded by coma for some hours; the result of effusion on the brain. The appearances of those examined *post mortem* were very similar. The lungs collapsed and shrunken, the heart and vessels loaded with blood, dark in colour, mostly coagulated and fibrinous; the intestines, both large and small, more or less congested or inflamed. In one there was a large mass of ulceration, the size of half a rupee, with a dark purplish inflamed margin near the pyloric end of the stomach, not perforating its coats, but very nearly doing so; and in another there were small patches of ulceration in the small intestines.

6. The treatment consisted in Tinct. Opii. ♏ xxx. on first admission, which in a few cases checked the diarrhœa, and then in different cases were tried different remedies, such as Lead and Opium, Calomel and Opium, Paterson's Pills, or the following draught after each action :—R. Acid. Sulph. dil. ♏ xxx., Ætheris Chlorici ♏ xx., Tinct. Opii. ♏ xx., Aquæ Menthæ ℥iss., which latter I found generally of more service than any of the preceding. To allay vomiting and hiccough, effervescing draughts, with a few drops of Creasote, which generally had the desired effect—or when the powers seemed to be failing, I gave the following mixture with advantage :—Sp. Ammon. Arom. ℥ss, Sp. Æther. Nitrici ℥ss., Tinct. Cardamomi Co. ℥ss., Mist. Camphoræ ℥iss., together with small and occasional doses of brandy, and water in moderate quantity was allowed them to drink. Sinapisms and dry rubbing were applied for the relief of the cramps, and hot fomentations, and turpentine stupes to the abdomen. On the cessation of the above symptoms, to enable them to regain their strength, I gave Quinæ Disulph. gr. ii., Tinct. Camphor. Co. ♏ xx., Acid. Sulph. dil. ♏ x. in a little water, which proved of much use. They were kept up from time to time with nutritious food in the shape of good broths, arrowroot, milk, &c.

7. The first admission occurred on 16th September, which ended in recovery in four days. Another came in on the 18th, and another on the 21st, which latter proved fatal from effusion on the brain (the case alluded to above) in six days. The next admission did not occur till the 26th, when they came in very rapidly five or six a day for two or three days, many of which proved fatal in less than twelve hours. Preparations were then made to encamp the prisoners; the huts requiring some little time to erect, they went out on the 10th October, since which there have been no admissions of a severe type, though there have been one or two of a mild nature.

8. The cells in the new jail have been freely fumigated, cleansed and white-washed, and new ventilations put in, the privies re-tarred and otherwise purified; the clothes and bedding have been chiefly burnt, and those but slightly soiled have been boiled and washed in water with a mixture of chloride of lime and wood ashes.

Art. V.—*Report on the Cases of Cholera treated at the Native Infirmary, Madras, from July to October* 1866. By Surgeon-Major W. J. vanSomeren, M.D., Surgeon 1st District.

(Communicated by the Principal Inspector General, Medical Dept.)

I have the honor, in accordance with Circular Memorandum No. 3466, dated 22nd August 1866, to report briefly upon the recent epidemic of cholera in my district, so far as that epidemic has come under observation in the Native Infirmary.

2. The last daily report shewed you that since the 14th July there had been 123 cases and 71 deaths, thus giving 42·277 as the proportion of recoveries *per centum*, and 57·723 as the death rate.

3. Of the admissions, 17 came from the Idiot Asylum, 35 from the Monegar Choultry, 2 from the Foundling, and the remainder from the town of Madras. While of these several numbers there were 8 casualties among the inmates of the Idiot Asylum, 24 among those of the Choultry, and 39 among the town cases.

4. Of the 24 deaths among the Choultry inmates, 22 occurred in individuals above the age of 45, and of the latter number, half (*i. e.* 11) were above the age of 55.

5. The alarming increase in the number of cases from the Choultry in September, led me to connect aggravation of the disease there with some local cause, and enquiry forced me to the conclusion that that cause was overcrowding. I accordingly recommended the removal of about sixty persons into tents, which was effected on the 12th September. Since that date there have been four admissions with cholera, three from the Choultry and one from the tents.

6. The same cause contributed to the rapid spread of the malady in the Idiot Asylum, and transfer of some of its inmates to the Foundling Hospital served to check its prevalence in the former institution.

7. Regarding the symptoms of the cases, I may mention that none was returned as a case of cholera, which did not present the rice-congee-water evacuations, associated with suppression of urine. Cramps existed in only one or two cases during the whole epidemic; and in two cases I observed a papular eruption during reaction. The appearance of this eruption (strange to say) I failed to enter in the case of a patient called *Israel*, but it has been noted in that of *Pariah*.

8. The treatment of the disease has been the same throughout the whole course of the epidemic, which, like all such visitations, was much more fatal at its commencement than at its termination. That treatment of course varied according to present symptoms. Vomiting was met with soda draughts or chloroform internally, assisted by counter-irritation on the pit of the stomach externally. Copious serous purging was combated with large doses (℥ss.-℥i.) of Dilute Sulphuric Acid, with Tr. of Lavand. (or Tr. of Catechu) ℥ i. and ℥ iv. of water, after each evacuation. Ammonia was used as a stimulant according to circumstances. And then, when reaction took place, to reduce injection of eyes and other head symptoms and to restore secretion of urine, if this continued suppressed, mild aperients were administered, followed by minute doses of Antimony when necessary, and the application of blisters to the vertex. And to remove persistent debility, mineral acids and bitter tonics were exhibited.

Art. VI.—*Report on the Cases of Epidemic Cholera treated in the Royapettah Dispensary, Madras, from 8th July to 1st November,* 1866. By Surgeon-Major P. G. Fitzgerald, M.D., Surgeon 4th District.

(*Communicated by the Principal Inspector General, Medical Department.*)

As no case of Cholera has been received into the Royapettah Hospital since the 1st instant, the Epidemic may now be considered to have ceased, and the statement of Practice referred to in Circular Memorandum No. 3466 of the 22nd of August last, from the office of the Principal Inspector General, to have become due.

2. The first case of the disease was admitted on the 8th of July and the last on the 1st of November. Between these dates there were 46 admissions altogether as in-patients. The out-patients, of whom there were 36 affected with cholera, are excluded from consideration in this Report, as the result of the very meagre and desultory treatment, to which alone they could be subjected, was unknown in the majority of them. Of the 46 cases treated in hospital, 25 recovered, 20 died, and 1 was removed soon after admission, the result of which was not ascertained.

3. The maximum time in hospital of the fatal cases (excluding one exceptional case of 5½ days duration) was 48 hours.

The minimum time	¾ hour.
The average time	12¾ hours.
Maximum time in hospital of recovered cases.	10 days.
Minimum ditto	2 ,,
Average ditto	5 ,, 15 hours.

4. Generally the patients were not brought to Hospital until the disease was far advanced, and a considerable number were brought only to die. Of the latter many were picked up by the police in the streets or in deserted sheds and verandahs, where their friends, if they had any, had left them;—these cases were hopeless and beyond the reach of help from their first admission.

5. In only 4 cases were cramps observed, and 4 others were distinguished by the discharge of one or more worms of the lumbricoid species from the stomach or bowels. These last all recovered.

6. The immediate exciting cause could very rarely be ascertained. In a few instances it was traceable to a drink of toddy, eating raw gram, or some other indigestible substance. The worms observed in the evacuations of the four cases before-mentioned were probably the exciting cause of the disease in them. Cases of this description are by no means uncommon among Natives and East Indians. I have observed them in every epidemic which it has been my fortune to witness in this country, and, as in the four cases just mentioned, recovery has been the rule among them. Perhaps in these cases the intestinal irritation induced the symptoms of the prevailing epidemic prematurely, as it were, and before the system was fully charged with the poison; thus provoking a milder attack than would have occurred had more time been allowed for its accumulation in quantity sufficient to develop the disease by its own innate force—for the same reason that inoculated small-pox was less fatal than that which occurred spontaneously, viz., because the disease was brought on at a time when the organism was in the most favourable condition for overcoming it.

7. The last case admitted was that of a Toty attached to the Hospital,—with this exception the servants and staff of the hospital, including a large body of students, as well as the patients admitted for other diseases, enjoyed complete immunity from the disease. I am disposed to attribute this fortunate circumstance, in a great measure, to the fact that the cholera patients at any one time were, of necessity, few in number, and were lodged in an open verandah in which no stagnation of foul air could occur, but which was nevertheless well sheltered from the inclemency of the weather by the surrounding buildings. The small rooms opening on this verandah were originally destined for the reception of cases of this and other diseases requiring segregation, but it was not considered advisable to occupy them until the alterations which had been ordered at my suggestion, for improving the ventilation, were carried out.

8. *Treatment.*—The condition in which a large proportion were when brought to hospital, rendered it necessary to have recourse to stimulants in the first instance. Afterwards, or if no stimulants were required immediately, calomel and carbonate of soda in doses of two grains each, were given every hour or two until six or eight doses were taken. If

the stomach was very irritable five grains of calomel were given as a first dose. Afterwards the calomel was generally re-placed by grey powder. In young children and infants grey powder was generally given instead of calomel. Concurrently with this, the patient was given, at longer or shorter intervals, according to circumstances, a dose of a mixture composed of a solution of sesquicarbonate of soda with spirit of nitrous ether, aromatic spirit of ammonia, and spirit of lavender. The drink was conjee-water ad libitum.

9. The object sought to be obtained was not so much the cessation of the evacuations as an alteration in their character—to hasten or induce those changes in the secretion of the liver and kidneys as well as of the intestinal glands which are observed always to accompany a real amendment in the course of the disease, and without which any other appearances, however promising, must be considered as uncertain if not illusory signs of improvement. Indeed after the disease was once thoroughly established, the sudden cessation of vomiting and purging, before the secretion of urine was re-established and the evacuations became somewhat coloured, was always a sign of ill-omen ; and even after those changes had taken place, it was by no means desired. In one case of the latter description a purgative enema was given with the most satisfactory result and the patient recovered.

10. For this reason opiates and astringents were considered inapplicable in the stage at which the disease had arrived when the patients were usually brought in, and Paterson's pills, though an excellent remedy for the premonitory diarrhœa, were only prescribed in one instance.

Turpentine, either alone or with castor oil, was given in all the cases in which worms appeared in the evacuations. In a case of threatening coma from uræmic poisoning, blisters to the head and loins removed the dangerous symptoms and placed the patient in safety.

11. The excreta were received into pans containing some of McDougall's disinfecting powder, and were afterwards buried. The foul clothing was boiled with water in chatties before being issued to the Dhoby.

12. During the last few weeks of the epidemic the small rooms of the verandah before mentioned, were available for the patients, who were accordingly moved into them during

the night, but always brought out again in the day-time. In this way the rooms were always kept fresh and clean, and I think the sick were the better for it. The recoveries, notwithstanding the late period at which the majority of the cases were brought under treatment, were 55 per cent.; but, were those cases which were beyond the reach of all remedy when first seen eliminated from the calculation, I do not hesitate to say that the proportion of recoveries would have been nearly 70 per cent.

ART. VII.—*Report on the Treatment adopted in the recent Epidemic of Cholera at Pollachy.* By Native Surgeon V. RUTHNUM MOODELLY.

(Communicated by the Principal Inspector General, Medical Department.)

1. WITH reference to para. 8 of Circular Memorandum No. 3466, dated 22nd August 1866, from the office of the Principal Inspector General, Medical Department, I beg to submit the following account of the treatment adopted during the recent epidemic of Cholera which prevailed in the Town and Talook of Pollachy.

2. As soon as the premonitory diarrhœa or first stage of Cholera set in, Dr. Paterson's pills composed of calomel, acetate of lead, opium, camphor, and powdered chillies in place of the aromatic powder, were administered in doses of ½ to 1 or 2 pills according to the age of the patient, in a little water or thin congee, after each motion, up to an average of 6 or 8 pills in number. Sinapisms, frictions, and external warmth were also used according to circumstances, and thin congee for nourishment.

In the stage of collapse, Condy's Disinfecting Fluid was tried in some cases but without success, probably from not being employed earlier. It had however, the effect of raising the pulse and temperature for a time before sinking ensued.

In some cases the acetate had the effect of suddenly stopping the evacuations, causing distension of the abdomen. One or two doses of calomel usually relieved the distress thus occasioned.

When vomiting was urgent and unaffected by sinapisms, a ten-grain dose of calomel with one of opium, had the desired effect.

3. Almost all the successful cases (the deaths being 7 out of 24, or 29 per cent.) were treated at their own houses, where they were free from the injurious influence of crowding several patients together, besides having the attention of their relatives.

4. I have also received accounts from the surrounding villages where cholera medicines were largely distributed, that where the acetate was used it was attended with favorable results.

5. The disease not being of a severe type, many cases in and out of the station were reported to have done well without any treatment or with simple native remedies. A great number of them may have been diarrhœa or choleraic diarrhœa dependent upon causes which determined famine elsewhere.

6. Simple sanitary rules were drawn out and circulated amongst the villages and enforced in the station from time to time.

Art. VIII.—*Report on the Cases of Epidemic Cholera treated in the General Hospital, Madras, from July 4th to October 31st,* 1866. By Surgeon W. N. Chipperfield, Acting Physician, General Hospital.

A Reference to the Madras Mortuary Reports for the last ten years shows that cholera is never completely absent from Madras, and that about once in three years, sometimes oftener, it prevails with epidemic influence. The second quarter of the year is *generally* (not always,) that in which the fewest cases occur, and the third quarter is *generally* that in which the disease is most prevalent and most fatal. This year the deaths from cholera were considerably below the average of the last five years, until the middle of the fourth week of March, when they exceeded the average; they then

rapidly declined and by the second week of April were again below the average, and continued so until the second week of June, when they rapidly increased. The disease broke out epidemically about the beginning of July. I have fixed the 4th of July as the date of the commencement of the epidemy so far as it came under my cognizance.

The records of the General Hospital will not afford any correct conclusions as to the comparative prevalence and fatality of cholera in Madras in the different months of the year, because when the disease is not epidemic, but few cases are brought to hospital, and those that are brought are almost always in a hopeless state.

I here submit:—

Table I, showing the Admissions and Deaths from Cholera in the General Hospital, during the first six months of 1866.

Month.	Europeans.		Eurasians.		Natives.		Total.	
	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.
January.....	2	1	...	...	7	3	9	4
February.....	1	1	2	1	2	0	5	2
March.....	...	...	1	1	2	1	3	2
April.....	...	...	...	...	...	...	...	...
May.....	...	...	...	...	1	1	1	1
June.....	2	2	...	...	3	2	5	4
Total...	5	4	3	2	15	7	23	13

giving a per-centage of 43·478 recoveries, and of 56·522 deaths.

I have prepared the following table in order to show at a glance, the date of admission, sex, age, duration of illness, result, condition on admission, and outline of treatment of every case admitted into the General Hospital during the continuance of the late epidemic.

Table II, exhibiting particulars of 114 *cases of Asiatic Cholera treated in the General Hospital, Madras, from July 4th to October 31st,* 1866, *during which time the disease prevailed under Epidemic Influence.*

EUROPEANS.

Date.	Sex.		Age.	Duration of Disease from commencement to termination.	Time in Hospital.	Results.		Condition on admission; concomitant symptoms.	Treatment.
	M.	F.	Yrs.			Recovered.	Died.		
July 4	...	1	16	Unknown	11 hours	...	1	A paralytic; deep collapse, cramps.	Oft repeated small doses of calomel. Stimulants.
„ 13	1	...	32	14 hours	6 „	...	1	Collapse, cramps, urgent dyspnœa.	do Bleeding.
„ 17	1	...	50	16 „	11 „	...	1	Collapse, dyspnœa, severe cramps.	do
„ 26	1	...	46	3½ days	22 „	...	1	do do do	do Free stimulation.
Aug. 2	1	...	33	7½ „	6½ days	...	1	Collapse, cramps, coma; no urine voided.	Nitric Acid and Chloroform, Emetics, Rhubarb and Chlorate of Potash.
„ 5	1	...	60	5½ „	5 „	1	...	Not collapsed; cramps.	Nitric Acid, Rhubarb.
„ 8	1	...	49	10 „	9¾ „	1	...	do violent reaction.	Chlorodyne, Salt Emetic, Calomel and Saline mixture.
„ 13	1	...	59	8 „	7½ „	1	...	Collapse, violent cramps, hiccup.	Calomel and Saline.

Table II. continued.

EUROPEANS.—(continued.)

Date.	Sex. M.	Sex. F.	Age. Yrs.	Duration of Disease from commencement to termination.	Time in Hospital.	Results. Recovered.	Results. Died.	Condition on admission ; concomitant symptoms.	Treatment.
Aug. 15	1	...	27	7 days.	6 days	1	...	Partial collapse, great restlessness.	Calomel and Saline.
„ 29	1	...	49	6 „	5¾ „	1	...	Collapse, no cramps.	do
„ 30	1	...	50	12 „	11½ „	1	..	Collapse, Mercurial Purging persisted, Ptyalism.	Calomel and Astringents.
Sept. 16	1	...	55	23 hours	11 hours	...	1	Collapse ; violent cramps.	Essence of Omum ; Saline.
Oct. 2	1	...	42	6 days	5½ days	1	...	Partial collapse ; cramps.	Saline Emetic and mixture.
„ 18	1	...	23	3½ „	3 „	1	...	Prostration ; no cramps.	Spts. Chloroformi, Quinine, Rhubarb and Chlorate of Potash.
„ 20	1	...	30	7 „	6 „	1	...	Partial collapse, cramps ; obstinate vomiting.	Spts. Chloroformi and Sulphuric Acid, Enemata.
„ 25	...	1	45	9 „	8 „	1	...	A paralytic ; no collapse, severe cramps.	Spts. Chloroformi and food.
Total...	14	2				10	6		

July	6	1	...	25	20 days	20 days	1	...	Not collapsed, no cramps, Roseola	Calomel and stimulants.
,,	7	1	...	25	19 ,,	19 ,,	1	...	Collapse, cramps, Roseola.	do
,,	9	1	...	20	17 ,,	17 ,,	1	...	Collapse, cramps, Uræmia, obstinate vomiting.	do Bleeding.
,,	17	...	1	20	Unknown	19 hours	...	1	Collapse, cramps.	do
,,	20	1	...	33	,,	4 ,,	...	1	Collapse, severe cramps.	do
,,	20	...	1	1¾	2½ days	2 days	1	...	Not collapsed.	Calomel ½ gr. every hour.
,,	20	1	...	8	3¼ ,,	3 ,,	1	...	Partial collapse.	do every ½ hour.
Aug.	6	1	...	5	13¾ hours	12¾ hours	...	1	Severe cramps, obstinate vomiting, collapse set in; dyspnœa.	Chlorodyne, effervescing salines. Food.
,,	8	...	1	7	5 days	5 days	1	...	Collapse; soon rallied, passed many ascarides lumbricoides.	Calomel and Saline, Tonics.
,,	14	1	...	13	12½ ,,	12 ,,	...	1	Imperfect collapse, rallied, but died comatose.	Salt emetic, Calomel, Castor oil, food.
,,	14	1	...	3	10 hours	8¾ hours	..	1	Collapsed, never rallied.	Stimulants and Calomel.
,,	17	1	...	19	7 days	6 days	1	...	Partial collapse.	Calomel and Saline.
,,	18	...	1	40	6¾ ,,	6 ,,	1	...	Collapse, cramps, Ptyalism.	Salt emetic, Calomel, dry cupping to loins; Pot. chloras and Chloroform.
,,	20	1	...	2	12 hours	2 hours	...	1	Deep collapse, never rallied.	Saline emetic.
,,	25	...	1	25	10⅔ days	10 days	1	...	Collapse, cramps; recently delivered; distress from secretion of milk.	Salt emetic, Calomel & Salines.
,,	26	...	1	21	13 ,,	12 ,,	1	...	Was delivered at full period of a still born child an hour after admission.	Hot Brandy and water. Food.
,,	26	1	...	30	9½ ,,	9 ,,	1	...	Not collapsed, cramps.	Astringents.

Table II. continued.

EURASIANS.—(continued.)

Date.	Sex. M.	Sex. F.	Age. Yrs.	Duration of Disease from commencement to termination.	Time in Hospital.	Results. Recovered.	Results. Died.	Condition on admission; concomitant symptoms.	Treatment.
Aug. 26	1	..	11	5 days.	5 days.	1	...	Not collapsed, no cramps.	Saline
„ 27	...	1	10	8 hours	3¾ hours	...	1	Collapse, never rallied, spasm of diaphragm.	Saline emetic, stimulants.
Sept. 4	1	...	19	5 days	5 days	...	1	Cramps, rallied and was walking about; but had a relapse on the 4th day and died in 16 hours.	Salines, Stimulants.
„ 10	1	...	12	12 hours	8 hours	...	1	Collapsed, no vomiting at first.	Castor oil.
„ 20	1	...	2	9 days	8 days	1	...	Collapsed, passed worms.	Food only, one dose of stimulant.
„ 24	1	...	5	3 „	3 „	1	...	Almost collapsed.	do do
„ 26	...	1	28	6½ „	6 „	1	...	Almost collapsed; at full period of pregnancy, and labor pains set in on 6th day, when recovered.	do and Spts. Chloroformi, Hot Brandy and water.
„ 27	...	1	50	27 „	27 „	1	...	Collapse, cramps.	Saline, Hot Brandy and water.
Oct. 2	...	1	3	10½ hours	5½ hours	...	1	Deeply collapsed, no rallying.	Omum Essence, Salt emetic.
„ 23	...	1	10	5½ „	2 „	...	1	do Coma.	Spts. Chloroformi and Opium, Saline.
Total...	16	11				16	11		

Table II. continued.

NATIVES.										
July	4	1	...	24	4 days	4 days	1	...	Collapsed.	Small doses of Calomel. Stimulants.
„	9	1	...	14	12 „	12 „	1	...	do	do
„	10	1	...	35	Unknown	4 hours	...	1	Deeply collapsed ; cramps.	do
„	10	...	1	29	do	23 „	...	1	do do	do
„	12	...	1	26	8 days	8 days	1	...	Collapsed ; cramps.	do
„	12	1	...	28	7 „	7 „	1	...	Partial collapse.	do
„	13	...	1	27	Unknown	4 hours	...	1	Collapsed ; cramps.	do
„	14	1	...	42	5 days	5 days	1	...	Partial collapse.	do
„	18	...	1	40	Unknown	5 hours	...	1	Deeply collapsed ; cramps.	do
„	20	1	...	25	do	23 „	...	1	do	do
„	21	1	...	25	25½ hours	7 „	...	1	Collapsed ; dyspnœa.	Calomel, Nitric Acid, and Chloroform.
„	26	1	...	33	14 „	6¼ „	...	1	do violent cramps.	do Arrack.
„	27	...	1	25	2½ days	2 days	...	1	Deeply collapsed ; never rallied, coma.	do do
„	29	...	1	48	2¼ „	2 „	...	1	Not collapsed, but became so rapidly, coma.	Chlorodyne, Calomel, Chloroform.
„	29	...	1	22	22½ hours	17 hours	...	1	Collapsed, cramps, dyspnœa.	Calomel and Chloroform.
„	29	1	...	40	7 days	7 days	1	...	Collapse.	Calomel and Ether.
Aug.	1	1	...	17	24 hours	22 hours	...	1	Collapsed, very restless.	Calomel and Salt drink.
„	1	1	...	11	8 days	7½ days	1	...	Collapse.	Calomel grs. v. Saline.
„	7	1	...	17	30 hours	13 hours	...	1	Collapse, dyspnœa, coma.	Saline.
„	8	1	...	70	24 „	9 hours	...	1	Collapse ; picked up in the street, starved.	Calomel, Saline. Food.

Table II. continued.

NATIVES.—(continued.)

Date.	Sex. M.	Sex. F.	Age. Yrs.	Duration of Disease from commencement to termination.	Time in Hospital.	Results. Recovered.	Results. Died.	Condition on admission; concomitant symptoms.	Treatment.
Aug. 10	...	1	48	2 days	22 hours.	...	1	Collapsed, cramps.	Saline, Stimulants.
,, 12	...	1	35	10½ ,,	10 days	1	...	Collapse, no cramps.	Saline, do
,, 12	...	1	6	11 ,,	10 ,,	1	...	Collapse, speedy rallying.	Saline, Food.
,, 13	1	...	38	7 ,,	7 ,,	1	...	do do	Saline, Stimulants.
,, 14	...	1	6	12 hours	3½ hours	...	1	Deeply collapsed, coma.	Salt emetic, Calomel.
,, 17	1	...	30	5 days	3 days	1	...	Not Collapsed.	do Saline.
,, 19	1	...	35	23 hours	17 hours	...	1	Deeply collapsed, starved, Hospital toty, but never in cholera ward, coma.	do do
,, 20	...	1	23	10 days	10 days	1	...	Collapsed, found lying in the street.	do and drink.
,, 21	...	1	16	5 ,,	4½ ,,	1	...	Collapsed.	do do Calomel.
,, 21	...	1	35	12 hours	7 hours	...	1	do no rallying.	Salt emetic, Stimulants, Calomel
,, 22	...	1	30	4½ days	3½ days	1	...	Partial collapse.	do Calomel.
,, 23	...	1	17	16½ hours	12 hours	...	1	Collapsed, cramps, dyspnœa.	do do Stimulants.
,, 23	...	1	25	6½ days	6 days	..	1	Collapse, rallied, relapse, coma.	do do do Blisters.
,, 24	...	1	26	16¾ ,,	16 ,,	1	...	Partial collapse.	do do do
,, 24	1	...	8	4¼ ,,	4 ,,	1	...	do. passed worms.	do do do

Table II. continued.

NATIVES.—(continued.)

Aug.	25	...	1	13	15 days.	15 days.	1	..	Collapsed, coma.	Salt emetic, Stimulants, calomel, Rhubarb, Blisters.
„	26	1	...	35	8 hours	¼ hour	...	1	Collapsed.	Nothing.
„	26	1	...	33	21 „	11 hours	..	1	do. cramps, dyspnœa	Saline and Calomel.
„	27	.	1	50	24 days	24 days	1	...	Partial collapse, ptyalism.	Calomel and Saline.
„	28	1	...	5	16 hours	7 hours	...	1	Deeply collapsed.	do do
„	29	1	...	58	Unknown	6½ „	...	1	do never rallied.	do do
Sept.	1	...	1	16	14½ hours	12 „	...	1	do do	Salines.
„	2	1	...	2	15½ days	15 days	1	...	Collapsed, passed worms.	Saline.
„	3	...	1	35	6 „	5½ „	1	...	Collapsed.	do
„	4	...	1	20	17 „	17 „	1	...	do very delicate.	do Rhubarb.
„	14	...	1	4	10 „	10 „	1	...	Partial collapse.	Food.
„	16	...	1	40	19 „	9 hours	...	1	Collapse, cramps.	Essence of Omum.
„	18	1	...	29	12 „	11 days	...	1	Partial collapse, rallied, on 7th day coma set in.	Salines and Stimulants. Purgatives, Blisters.
„	18	1	...	35	33 hours	11 hours	...	1	Collapsed, bruise on head, dyspnœa.	Saline.
„	22	...	1	25	10½ „	3½ „	...	1	Collapse, cramps.	do
„	22	1	...	48	5¼ days	5 days	1	...	Not collapsed.	do emetic, Hot drinks.
„	23	1	..	28	11 hours	6¾ hours	...	1	Deeply collapsed, cramps.	do
„	23	1	...	10	6⅛ days	6 days	1	...	Collapse.	do emetic, Food.
„	23	1	...	35	11¾ „	11 „	1	...	Deeply collapsed.	do Food, Dry cupping.
„	25	1	...	35	Unknown	5½ hours	...	1	Deeply collapsed, severe cramps, dyspnœa, starved.	do
„	26	1	...	24	4 days	8 „	...	1	Deeply collapsed, severe cramps, dyspnœa, starved; treated at Native Infirmary for 3 days.	do Stimulants.

Table II. continued.

NATIVES.—(continued.)

Date.	Sex. M.	Sex. F.	Age. Yrs.	Duration of Disease from commencement to termination.	Time in Hospital.	Results. Recovered.	Results. Died.	Condition on admission; concomitant symptoms.	Treatment.
Sept. 26	...	1	20	13 days.	11 days	1	...	Partial collapse; retention of urine; drowsiness.	Food, Hot mulled port, Catheterism.
„ 28	1	...	35	38 hours	27 hours	...	1	Deep collapse, exhaustion.	Saline.
„ 28	1	...	36	3 days	3 days	1	...	No collapse, vomited worms.	do
„ 28	1	...	50	12½ „	12 „	1	...	Deep collapse, starvation.	do Hot Arrack and water.
„ 28	1	...	3	10 „	10 „	1	...	Collapse, passed worms.	do
„ 30	1	...	1⅙	4 „	3½ „	1	...	Partial collapse.	do Wine and water, hot.
Oct. 7	...	1	35	Unknown	6 „	1	...	Very feeble.	do Hot Arrack toddy.
„ 8	...	1	60	2 days	46½ hours	...	1	Deep collapse, no rallying.	Salines, Hot Brandy and Water
„ 14	...	1	25	4½ „	4 days	1	...	No collapse, rice water purging and vomiting.	Chlorodyne, Food.
„ 16	...	1	8	8 „	8 „	1	...	Partial collapse.	Saline and Spts. Chloroformi.
„ 18	...	1	10	12¼ „	12 „	1	...	Deeply collapsed, coma.	Hot Arrack toddy, Rhubarb, Pot Chloras and Quinine.
„ 20	...	1	4	Unknown	2 hours	...	1	do no rallying.	Acetic Acid.
„ 25	1	...	70	10 days	9¼ days	1	...	Collapsed, starved.	Chlorodyne 3 doses, Saline.
„ 29	1	..	15	10 hours	3½ hours	...	1	Deeply collapsed, coma, no rallying.	Saline.
„ 31	1	...	41	7 days	5 days	1	...	Partial collapse, Starvation.	do Hot stimulants.
Total...	38	33				36	35		

Meteorological Condition *of Madras previous to, and during the continuance of, the Epidemic.*

The diagrams drawn up by Dr. Arnold Smith and attached to the *Madras Mortuary Reports* which are printed in Nos. 19 and 20 of this Journal will afford all the information needed on this point. During the first half of the year the *temperature* was much above the average; the maximum in the second week of June was 106°, being 10° above the average. From March the *velocity of the wind* was much above the average. The per-centage of *humidity* and the *rain-fall* were much below the average, and there was a general absence of thunder-storms. Just previous to the outbreak very hot winds blew with great violence from the western quarter, and several dust-storms, not followed by rain, occurred. For three consecutive days at the beginning of July, Madras seemed to be almost continuously enveloped in an atmosphere of dust reaching to a considerable height.

During the continuance of the epidemic, the *Barometer* showed but little variation from the average atmospheric pressure. The *Humidity* was from 4° to 7° below the average of the last 20 years. The *Rain-fall* was very deficient; up to the end of June only 0·316 of an inch had fallen during the year—a deficiency of 6·35 inches; up to the end of September, 8·96 inches had fallen, being 10·73 inches below the average; and up to the end of October 17·66 inches had fallen, being 14·98 inches less than the average. The *Temperature* was very high during the entire period; varying from 2° to 4° above the average. The *Velocity of the Wind* was unusually great; its *Direction* from the second week of June to the middle of October was principally from the South-west, subsequently from North by East.

Localities *from which the patients were brought to Hospital.*

Districts of Black Town	21
John Pereira's	19
Poodoopettah	14
Chintadrepettah	13
New Town	13
Neighbourhood of Pursewaulkum	6
Fort St. George	6
Unknown (chiefly strangers recently arrived at Madras, and persons picked up in the streets)	22
Total	114

The Influence of Season *on the Prevalence and Fatality of the Disease.*

TABLE III, *showing the number of Admissions, Recoveries and Deaths in each of the four months during which the epidemic influence prevailed.*

Months.	Europeans.			Eurasians.			Natives.			Total.			Percentage of total	
	A.	R.	D.	A.	R	D.	A.	R.	D.	A.	R.	D.	Recoveries.	Deaths.
July.....	4	0	4	7	5	2	16	6	10	27	11	16	40·75	59·25
August.....	7	6	1	12	7	5	25	12	13	44	25	19	56·82	43·18
September.....	1	0	1	6	4	2	21	12	9	28	16	12	57·14	42·86
October.....	4	4	0	2	0	2	9	6	3	15	10	5	66·66	33·33
Total.....	16	10	6	27	16	11	71	36	35	114	62	52		
Percentage of Recoveries.	62·50			59·26			50·71			54·386*				
Do. of Deaths.	37·50			40·74			49·29			45·614*				

The above table shows that the late outbreak did not generally depart from the well-known law of epidemics, more marked perhaps as regards cholera than other affections, that on the first onset of the disease a large proportion of the cases die, that the proportion of fatal cases gradually diminishes, and that, as the epidemic influence declines, the cases become milder and the greater number recover. The table further shows that this general law was more strictly observed among the European and Native races than among the Eurasians, as regards whom it was but imperfectly followed. The limited number of cases embraced in the table may account for this. I shall have to allude again to this law when speaking of the

* The per-centages of the total recoveries and deaths here given are strictly accurate, and are not arrived at, as is usually the case, by dividing the sum of the per-centages given by the number of instances given. The latter procedure would have shown a more favourable total percentage than was actually the case. Thus $62·50 + 59·26 + 50·71 = 172·47$, and $172·47 \div 3 = 57·490$ instead of 54·386; and $37·50 + 40·74 + 49·29 = 127·53$, and $127·53 \div 3 = 42·510$ instead of 45·614.

results of treatment, and I think it right to mention here that I fully recognize that any deductions drawn solely from the limited number of cases admitted into the General Hospital, must be liable to the corrections which a far more extended experience may absolutely enforce.

TABLE IV, *showing the total number of Admissions, Recoveries and Deaths of each Sex of the three Races treated during the epidemic, with percentages of recoveries and deaths.*

Race.	Admitted.		Recovered.		Died.		Percentage of Recoveries.		Percentage of Deaths.	
	Males.	Females.	Males.	Females.	Males.	Females.	Males.	Females	Males.	Females.
Europeans.	14	2	9	1	5	1	64·28	50·00	35·72	50·00
Eurasians...	16	11	9	7	7	4	56·25	63·64	43·75	36·36
Natives.....	38	33	19	17	19	16	50·00	51·52	50·00	48·48
Total...	68	46	37	25	31	21	54·41	54·35	45·59	45·65

The Influence of Sex.—Some authors assert that sex has an influence on cholera, that fewer females are attacked than males, and that females die in greater proportion than males, in consequence of their less powers of resistance to disease. We have no proof that females suffer less than males. The fact that as regards Europeans and Eurasians, fewer women than men are admitted into hospital, is no criterion by which to judge of the proportion of attacks in the two sexes, and table IV shows that there is but very little difference in the percentage of mortality in the two sexes under hospital treatment.

The Influence of Race.—From table III it will be observed that, in respect of the three races, the results were the most favorable as regards Europeans, next as regards Eurasians, and least favorable as regards Natives. And from table IV it may be learnt that the recoveries in the six classes treated were favorable in the following order:—1. European

males; 2. Eurasian females; 3. Eurasian males; 4. Native females; 5 and 6, European females and Native males. I consider it would be absurd to argue from a series of 2, or of 16, or of 27, cases of such a disease as cholera; so I lay no stress whatever upon these particular results, but prefer to look only to the total, and I find that—

General Mortality:—the General Hospital cases give a percentage of recoveries of 54·386, and of deaths of 45·614. I have no desire to contrast these percentages with those which have been attained by other practitioners. I am quite aware that compared with results published in order to illustrate the efficacy of particular methods of treatment, my total percentages are very unfavorable.

Thus Dr. Mudge* gives the result of his treatment by turpentine emulsion, in a period of eighteen months, as 69 cases treated, 42 recoveries and 27 deaths; affording a percentage of 60·87 recoveries and 39·13 deaths.

Dr. Donaldson,† by a combination of stimulants, antacids, opiates, sedatives and astringents, saved 12 out of 18 cases.

Dr. Mackay‡ reports six successive recoveries under a disinfecting treatment, principally by solution of chlorinated soda.

Mr. Evezard§ reports an extraordinary success with from half a drachm to a drachm of undiluted Condy's fluid diffused through half a tumblerful of water and given every half-hour. His report gives fifteen successful cases and one unsuccessful case; but I am not aware of what his subsequent experience may have been.

[As I shall not have occasion to allude to this method of treatment again, I may here state that, in obedience to the orders of the Principal Inspector General, I tried Condy's fluid, according to Mr. Evezard's instructions, in

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* Madras Quarterly Journal of Medical Science. Vol. vi. page 442.

† *Treatment of Asiatic Cholera.* Reprinted from Edinburgh Medical Journal, Dec. 1863. Gantz Brothers, Madras.

‡ Madras Quarterly Journal of Medical Science, Vol. vi., page 451.

§ Do, Do, Do, Vol. vii., page 341.

five successive cases, all of which proved fatal. I must confess that I was not hopeful of success, for I knew that Condy's fluid is a powerful destroyer of organic tissue.

In *The Lancet* for August 25th, 1866, page 219, I find the following in an article headed *Cholera Correspondence.*

"Mr. W. Whitehead (Mansfield, Woodhouse) suggests a trial in cholera of 'the injection into the circulation of either chlorate of potash or permanganate of potash. The injection of medicinal agents,' he adds, 'in cases of cattle-plague was so far encouraging to me, that, I believe, had the new regulations permitted my continuing experiments, I could have brought them to a successful conclusion'."

I trust that the injection of permanganate of potash into the circulation of human cholera patients will not be rashly performed,—will never be undertaken until ample experiment has been made upon the lower animals. As Professor of Anatomy at the Medical College a few years ago, I caused a subject to be injected with Condy's fluid diluted with fifty times its weight of water, and the result was an immediate decomposition of the tissues, the muscles becoming green and putrid, and the subject totally unfit for dissection.

It may be said that this only proves the power of the permanganates in oxydizing and destroying *decaying* animal tissue. But if any one in the habit of using the microscope will experiment, with solution of the alkaline permanganates, upon foul water, he will find that the first effect is the destruction of putrefactive matters whether of a vegetable or animal origin, but that the action does not cease here. Living beings are attacked and in a special order too; first, the infusoria, polygastria, &c., and then the small entomostraca;—all will succumb if the dose be sufficient. Is it not a perfectly natural conclusion that the blood globules would be destroyed by the permanganate? and if so, could they be supplemented by a new generation with sufficient rapidity to support life? Could it be possible for the dose of permanganate to be so apportioned as merely to destroy the supposed (?) germs of cholera, without exercising any injurious influence upon the blood?]

From the *Satistical, Sanitary and Medical Reports of the Army Medical Department,* I find the following were the numbers of admissions and deaths from cholera among the

British Troops serving in the three Presidencies of India, in the following years :—

Years.	Bengal.			Madras.			Bombay.		
	Admitted	Died.	Percentage of Deaths.	Admitted	Died.	Percentage of Deaths.	Admitted	Died.	Percentage of Deaths.
1860	953	528	55,404	84	37	44,048	181	105	58,011
1861	1,423	880	61,841	70	29	41,428	48	35	72,875
1862	520	326	62,688	88	46	52,273	78	55	70,513
1863	232	157	67,672	119	47	39,496	12	8	66,666
Total..	3,138	1,891	60,261	361	159	44,044	319	203	63,636

The Bombay and Bengal mortality appears high, especially when contrasted with that of Madras. As we cannot for a moment admit that there is any superiority as regards treatment in the latter Presidency, or any error in the returns, we must conclude either that the disease was of a milder form, or that the condition of health and power of resistance to disease were greater during these years among the Troops serving in Madras than among those serving in the other Presidencies. It will be observed that the mortality among the Madras British Troops from cholera in the above years closely approximates to that met with among all classes of patients in the General Hospital during the past four months.

Coming to more recent statistics and confining observations to the epidemic of 1866, I am informed that Dr. vanSomeren's experience at the Native Infirmary affords results still less favorable than mine, viz., 123 cases with 52 recoveries and 71 deaths, a percentage of recoveries of 42·277 and of deaths of 57·723. I feel perfectly satisfied that these results are amply accounted for by the fact that by far the majority of Dr. vanSomeren's patients were old, worn-out, half-starved, diseased persons from the Monegar Choultry, &c., or persons whose powers of resistance to disease were at the lowest ebb ; whereas many of my patients were persons in the prime of life and with fair vigour of constitution. See table VI.

Here I enter some notes I have taken of Cholera mortality from reports recently published in the London journals.

From *The Lancet*, August 18th, 1866 :—

The Cholera in Holland, August 1866.

Towns.	Attacks.	Deaths.	Percentage of Mortality.
Amsterdam.....	608	560	92·105
Leyden.....	1,321	878	66·449
Grananhaya	1,371	775	56·455
Delft.....	638	397	62·225
Schiedam.....	347	227	65·418
Rotterdam.....	1,595	994	62·319
Gonda.....	244	139	56·967
Utrecht.....	2,148	1,464	68·156
Derdrecht.....	578	358	61·937
Kempen.....	396	226	57·070
Meppel.....	319	193	60·533
Gröningen.....	1,527	863	56·516
Total...	10,484	6,514	62·132

As I imagine that there must be some mistake in the Amsterdam returns, I have omitted them from the total.

From *The Medical Times and Gazette*, Sept. 29th, 1866 :—

The Cholera in Nine Provinces of Belgium, to August 21*st*, 1866.

Province.	Cases.	Deaths.	Percentage of Mortality.
Antwerp.....	6,956	3,575	51·394
Brabant.....	6,597	4,034	61·149
West Flanders.....	666	402	60·360
East Flanders.....	5,994	3,426	57·157
Hainaut.....	4,230	1,581	37·375
Liege.....	4,919	2,787	56·657
Luxemburg.....	1,084	577	53·229
Limburg.....	131	57	43·511
Namur.....	574	260	45·418
Total...	31,151	16,699	53·606

From *The Medical Times and Gazette*, Sept. 8th, 1866:—

Cases admitted into the Cholera wards of the London Hospital, from the outbreak to Sept. 6th, 1866.

Admissions	515
Recoveries	196
Deaths	272
Remain	47

Assuming that the 47 remaining cases all recovered, this gives a percentage of mortality of 52·801.

I have not met with any reports of cases admitted into the other London Hospitals, nor of any statistics showing the proportion of deaths to attacks in the whole of the metropolis. The latter, I presume, are not to be obtained, as the Registrar General only records the number of deaths from and not the number of attacks of disease.

The object of referring to these percentages here, is to show:

1. That the late outbreak of cholera has been a very severe and fatal one;

2. That cholera mortality—and equally the effects of remedies—is not to be judged of by the results of a few cases only; in other words, that the value of statistical tables, generally, is in proportion to the largeness of the numbers they embrace.

In order to illustrate this, I have collated the percentages I have alluded to, in the following table.

Authority.	Cases.	Percentage of mortality.	Authority.	Cases.	Percentage of mortality.
Dr. Mackay	6	0·000	London Hospital	515	52·801
Mr. Evezard	16	6·250	British Troops in India	3,818	59·069
Dr. Donaldson	18	33·333	Holland	10,484	62·132
Dr. Mudge	69	39·130	Belgium	31,151	53·606
Genl. Hospital	114	45·614			
Native Infirmary	123	57·723			

Further, I would remark, that the value of statistics of treatment and its results is very much enhanced by a kind of classification of the cases, and by a careful comparison of their severity at the time they first come under observation. And this leads me to notice,—

The Condition of the patients on admission—as recorded in the Hospital "Cholera Register", which is carefully written up (at half-hour or shorter intervals, during the continuance of the severer symptoms,) by the Apothecary on duty.

TABLE V., *showing the Condition on Admission into the General Hospital, Madras, of the* 114 *patients treated during the epidemic.*

Condition on Admission.	Cases.	Recovered.	Died.	Percentage of Recoveries.	Percentage of Deaths.
Deeply collapsed.....	27	3	24	11·111	88·889
Collapsed with severe cramps.....	20	6	14	30·000	70·000
Collapsed without cramps.....	30	21	9	70·000	30·000
Partially collapsed.....	22	20	2	90·909	9·091
Not collapsed with cramps.....	6	4	2	66·667	33·333
Not collapsed and without cramps.	9	8	1	88·889	11·111
Total...	114	62	52	54·386	45·614

The figures given in this table appear to support the conclusion :—

1. That cholera cases treated in hospital are fatal in proportion to the severity of the symptoms on admission ;

2. That cholera cases, in general, are fatal in proportion to the completeness of the collapsed condition.

This may not be so apparent to others from the classification I have made, as it is to me, for the mortality among the cases "partially collapsed" when admitted, is shown to be less than that among those "not collapsed with cramps" and those "without either collapse or cramps." But here, again, I would remark that the numbers embraced in the latter two classes are not sufficient to permit of any correct deductions. And we must acknowledge one disturbing cause as to the first conclusion, viz., that some cases in which the symptoms on admission are comparatively mild do subsequently pass into collapse, or into coma from either effusion on the brain or from uræmic poisoning.

3. The table fairly shows that the great majority of cases admitted into a General Hospital are of a severe character.

The Influence of Age.—The following table appears to me to have some interest attaching to it.

TABLE VI. *showing the Age of* 114 *Cholera patients treated in the General Hospital, July 4th to October* 31*st,* 1866.

	Europeans.			Eurasians.			Natives.			Total.			Percentage of total		
	A.	R.	D.	A.	R.	D.	A.	R.	D.	A.	R.	D.	Admissions.	Recoveries.	Deaths.
Under 5 years.	...	...	...	5	2	3	5	4	1	10	6	4	8·772	60 000	40·000
From 5 to 10 „	...	...	...	4	3	1	5	3	2	9	6	3	7·895	66·667	33·333
„ 10 to 15 „	...	...	...	5	1	4	5	5	0	10	6	4	8·772	60·000	40·000
„ 15 to 20 „	1	0	1	2	1	1	6	1	5	9	2	7	7·895	22·222	77·778
„ 20 to 25 „	1	1	0	3	2	1	6	4	2	10	7	3	8·772	70·000	30·000
„ 25 to 30 „	1	1	0	5	5	0	13	4	9	19	10	9	16·666	52·632	47·368
„ 30 to 35 „	3	1	2	2	1	1	4	2	2	9	4	5	7·895	44 444	55·556
„ 35 to 40 „	...	...	...	...	...	...	13	6	7	13	6	7	11·403	46·154	53·846
„ 40 to 45 „	1	1	0	1	1	0	5	3	2	7	5	2	6·140	71·428	28·572
„ 45 to 50 „	4	3	1	...	...	...	3	2	1	7	5	2	6·140	71·428	28·572
„ 50 to 70 „	5	3	2	...	...	...	4	1	3	9	4	5	7·895	44·444	55·556
Above 70 „	...	...	...	...	...	...	2	1	1	2	1	1	1·754	50·000	50·000
All ages ...	16	10	6	27	16	11	71	36	35	114	62	52	100·000	54·386	45·614

To make this table of any real use we need statistics which are not at present available, so far as Madras is concerned, viz., the number of individuals living at the ages embraced in each of the above quinquennial periods.

An examination of table VI. shows that no age is exempt from the disease. The hiatus up to 15 years in the European column is accounted for by the fact that there are few pure European children among the class of patients seeking admission into the General Hospital,—their young swell the numbers of the Eurasian column. From 15 to 45 years there were 7 Europeans admitted, and from 45 to 60 there were 9 admitted. Again, I ask, what are the relative numbers of European residents of Madras at these ages? The want of admissions of Eurasians above 45 years of age is, I think, accounted for by the fact that the number of living persons of this race above 45 years of age is comparatively small. I have no wish to argue from my table, but I can but think that the column of percentages of admission at the different ages bears, as regards adults, a very close correspondence to the proportion of living persons at these ages.

The Constitutional condition of the persons attacked. It has been stated that "vigour of constitution predisposes to cholera," and that "it is seldom, comparatively speaking, that we hear of an old man or woman being attacked with the disease."

These statements are founded principally upon Army statistics leading to the conclusion that "the older soldiers have been less frequently attacked than the younger men."

However it may be with European soldiers, until sufficiently comprehensive and conclusive statistics shall be produced to disprove the belief, I must hold the opinion that we have no proof that vigour of constitution predisposes to cholera, so far as the general population is concerned. I feel sure Dr. vanSomeren will support me in the belief that during the late epidemic, the number of attacks has been increased and the mortality augmented, by the high price of food-stuffs which has ruled in Madras during the last few months. Many of my patients were in the most wretched state of emaciation from privation. I observe that Dr. vanSomeren reports 35 admissions from the Monegar Choultry with 24 deaths, 22 of which occurred in persons above the age of 45 years, and, of the latter number, one-half (*i. e.* 11) were above the age of 55. It is seldom that we see a vigorous native above the age of 45 years, and almost all natives above 55 years might be included in one grand class, headed *Senectus*. *See Appendix* 1.

The Epidemic. *Primary Symptoms.*—In very few cases was there any history of premonitory diarrhœa, and when this did occur it was of no long continuance. The peculiar rice-water discharges, and the suppression of urine, in most instances, set in without any previous diarrhœa, and, in my experience, this is most frequently the case in tropical cholera. Table V. shows that two-thirds of the cases (77 in 114) passed into complete collapse, and that nearly two-thirds of the remainder (22 in 37) became partially collapsed. Very commonly in the deeply collapsed cases there were no discharges from the bowels during the continuance of this state. But it was frequently pointed out to the clinical class that, by a little careful palpation of the abdomen, it became quite evident that, although there were *no discharges from* the bowels, there was abundant and increasing *transudation into* them. In most cases the intestines

appeared quite full of fluid matters before death occurred, and in some a considerable post-mortem flux happened.

One successful case was a second attack during the year; the patient, a half-witted Eurasian, having had a previous attack in February last.

In one case only was there a relapse; a Eurasian youth recovered so completely from the primary attack, as to be removed into the convalescent ward; but about sixty hours afterwards the symptoms re-appeared with great violence; he fell into complete collapse with urgent dyspnœa, and died after sixteen hours severe suffering.

Secondary Phenomena observed. *Coma.*—Sixteen of the 114 patients fell into a comatose condition; about two-thirds of this number into deep coma. Of the 16 cases, 11 proved fatal. Two were brought in comatose; this condition supervened soon after admission in 5 cases, and proved fatal in from 3½ to 23 hours; in 2 cases, in 2 days; and in 2 cases coma set in about the 7th day and proved fatal on the 11th and 12th days respectively. Five of the 16 cases recovered, the coma set in from the 4th to the 7th day and the recovery was complete on the 10th, 11th, 12th, 15th, and 20th days respectively. In some of these and in several other cases (not shown in table II.) a comatose condition supervened upon apparent recovery, the secretions having become quite restored and natural; but, in all, suppression of urine again occurred, followed by giddiness, headache, injected conjunctivæ, stupor and coma.

Urgent dyspnœa, was present, according to table II, in 16 cases; all terminated fatally. I do not think that this represents the full number of cases in which this symptom was present, but only those in which it was observed early and was very urgent. In many of the fatal cases the mode of death was by apnœa; difficulty of breathing coming on shortly before the cessation of life. I have read Dr. G. Johnson's work and his explanation of this symptom, viz., spasm of the ultimate branches of the pulmonary artery. That this and collapse of the lung was the pathological condition in some of my cases I have no doubt, but in several it appeared to me that the dyspnœa arose from pulmonary hypostasis; while in not a few, I am convinced it was the result of spasm of the diaphragm, for the respiration was purely costal, principally costo-superior, the abdominal muscles were tense and unmoved, and the suffer-

ers complained of violent cramps in the epigastrium and under the margins of the ribs, and the dyspnœa was continuous.

Eruptions.—I cannot say that every patient was carefully examined for eruptions. Two cases presented some roseolous patches on the thorax and fore-arms, and one a rather extensive eruption of erythema punctatum, on all parts of the trunk and limbs.

Pregnancy.—Two women were admitted at near the full term of pregnancy. One had been ill twenty-four hours before coming to hospital; she was delivered of a still-born child an hour after admission; rice-water purging and vomiting continued for some hours without the patient falling into collapse, and she recovered. The other woman recovered from cholera and on the evening of the sixth day, she being then convalescent, labour-pains set in—and she was sent to the Lying-in Hospital. I ascertained frequently during her illness, and shortly before she left, that the fœtal heart was beating vigorously, but I heard that she was delivered within two days of a dead child.

Dr. Harris, superintendent of the Lying-in Hospital, pointed out to me the impropriety of sending a woman recently recovered from cholera to the Lying-in Hospital for delivery, as she might be a source of infection and a puerperal fever be generated in the wards. Fully acknowledging the propriety of avoiding any *chance* of such infection, I promised Dr. Harris that I would not err in this respect in future, but should a similar case occur I would make arrangements for the accouchement to take place in the General Hospital, ill-adapted as that institution is for any such purpose. I am happy to be able to state that in this one instance no bad results happened. Referring to the Lying-in Hospital, I am reminded that a case of cholera arose in that institution in July, in a young Eurasian woman who had been delivered seven or eight days. She was transferred to the General Hospital and died collapsed in a few hours.

Lactation.—Several lactating women came under treatment; some a few days after delivery. The secretion of milk was not arrested in any one of them, and most of them suffered severely from distension of the mammæ, and recourse was had to belladonna liniment to "disperse the milk."

One woman, unknown to me at the time, suckled her child during her entire illness, without any ill-effects happening to the infant.

Menstruation.—Several women menstruated immediately upon recovery; some stated that the period was anticipated, some that it was delayed, the menses having been irregular previously, in one case absent for four months. One girl menstruated for the first time after recovery from a comatose condition.

Hæmorrhage.—I have not noticed any hæmorrhage from the bowels or vagina. Epistasis occurred in one case only, viz., the last case of recovery from coma. This led me to remark to the clinical class that in future, I should apply a leach to each nostril in those cases in which coma occurred.

The Question of the Contagiousness of Cholera. Dr. Aitken * says:—"It is curious that in India, the birth place and head-quarters of the disease, the doctrine of contagion is almost universally disbelived in by our professional brethren. The opinion generally entertained in India is opposed to the doctrine of contagion." Dr. Aitken's work shows him to be so industrious in collating the opinions of different writers, that it is probable that he has examined the writings of a sufficient number of authors to enable him to make the above statement. I have neither leisure nor sufficiently extensive materials at command for verifying or disproving it, but until I read the above, my belief was that the greater number of practitioners in India were contagionists. However there is much to be said on both sides of the question. We almost always have the disease amongst us—it is endemic in Madras—and yet we do not find any great fluctuation in the number of deaths from cholera until an epidemic influence is impressed upon the disease. Were the disease eminently contagious we might expect, knowing how fatal it is, that where endemic there would be a rapidly increasing, instead of a tolerably steady mortality from it, and that sporadic cases of cholera would never be heard of. For every person suffering from the disease would necessarily become a focus of contagion, and we know of no protecting power against cholera, in the way that vaccination is

* Science and Practice of Medicine, 2nd ed. vol. i. page 649.

protective against small-pox* or as one attack of the exanthemata or whooping cough is protective against a second attack. Many observers, Mr. John Simon, Dr. W. Budd, Dr. Bidie, &c., have insisted upon the infectiousness of cholera discharges; and the way in which an encamped Regiment becomes attacked when unfortunately halted upon ground which has previously been occupied by an infected camp would seem to be conclusive that, at a certain stage of decomposition, cholera discharges are infectious.

I here mention certain facts which have come to my knowledge during the late epidemic, and which may be differently interpreted by different persons.

1. A man, his wife, three children, and two servants, resided in a house in Poodoopettah, where cholera was raging. One child was attacked and recovered; a second was seized and died at home; the maty-boy was seized, brought to hospital collapsed, and died; the father was attacked the same day, brought to hospital and recovered; the daughter was brought in the next morning, and the ayah in the afternoon, the former recovered, the latter died. The wife only escaped the disease. It may be said that these attacks occurring within a few hours of each other resulted from the patients receiving, at one and the same time, a dose of the poison of epidemic disease, and that this instance neither proves nor disproves the influence of contagion; whilst the escape of the wife, who was assiduous in her attentions to the sufferers, would rather point to the non-contagiousness of the disease. I incline to this view.

2. Store-sergeant P. died in hospital of cholera, on June 15th. His widow and two children, with their trunks of clothes, &c., were received into the house of a brother-in-law, Conductor T., residing in Fort St. George. On July 17th Condr. T. was seized with cholera, other cases occurring in the Fort at the same time among the Rifles, the Artillery and their families; he was brought to hospital and died. Immediately afterwards the family were moved from the Fort into Black Town. The next day the widow and two children were attacked. (They declined to come into hospital, so, by request, I superintended the treatment at their house; all three recovered.) Mrs.

* Mr. Blacklock has lately published his "impression" that small-pox and vaccination have a certain protective influence against cholera. He has never known a person deeply pitted or recently vaccinated die of cholera.

T. and her children were ministered to by her two sons, daughter, son-in-law, and servants, none of whom were attacked. The popular belief is that Mrs. P. conveyed the clothes her husband wore into the Fort,—though there is no evidence to show this,—and that Condr. T. was seized in consequence of these clothes acting as *fomites*.

3. About the same time a Serjeant of the Garrison Band, residing in the Fort, and his two children were seized on the same day with cholera and brought to hospital, the former died, the latter recovered. These persons were attended by many relatives, nine or ten at least; not one of whom was attacked.

4. A Store-serjeant, his wife and two children resided opposite the western gate of the Hospital. The infant was attacked with cholera and recovered. Two days after its recovery the elder child was attacked and died. The same day, the wife (alluded to above, under the head *pregnancy*, as having been delivered of a still-born child an hour after admission) was attacked; she recovered. The wife's father and sister, residing at Pursewaukum, came to the house to attend the funeral of the elder child. Next day both were attacked and brought to Hospital; the man recovered, the girl died. The Store-serjeant himself escaped. Many persons would consider that the wife's attack was the result of contagion. I am not prepared to deny this. I saw her with her clothes saturated with the discharges from her infant, and cautioned her on the subject. I can say nothing about the elder child, as I never saw it. It may be thought that the wife's father and sister also contracted the disease by contagion, but it is only right to mention that cases of cholera had previously been brought from Pursewaukum, showing that the epidemic influence was at work there.

5. Several of the regular ward coolies and several extra coolies have been engaged in close attendance upon the sick, assiduously rubbing them, &c, so that they must have been frequently contaminated by the cutaneous exudation and the discharges of the patients. One female attendant in particular performed her duties in the most praiseworthy manner, attending to the wants of the patients in every way both day and night. An extra sweeper was engaged and was constantly employed in removing, burying and disposing of the discharges and washing the patients' clothes, which were often saturated with evacuations. I am glad to say that not one

of these persons has had the slightest symptom of the disease. Under the head of *Treatment* I shall presently show that careful measures of disinfection were put in practice, and the immunity of these attendants may be partly due to this.

There are very many circumstances connected with cholera which it appears to me have not been brought forward in such a shape as to allow of correct conclusions being drawn therefrom,—and this not only as regards contagion, but also with respect to other matters, some of which have already been alluded to. But I do not hesitate to say that, as at present informed, I believe there is quite sufficient evidence, that cholera may be spread by human intercourse, but that it is much more often and much more extensively disseminated by means of that mysterious influence which, for want of a better name, we call epidemic. And further, I consider that those who hold the opinion that cholera is *eminently contagious* too often overlook the fact, that the disease has often originated, and may, with infinite frequency, again originate *de novo*, under local conditions of overcrowding, extreme heat, squalor, want, filth, and wretchedness of every kind. There is abundant proof that violent outbreaks of cholera have arisen from the use of putrid food; and that such food may be the determining cause of attacks when the disease is prevailing epidemically. Several of the cases, under review, were distinctly attributed by the sufferers themselves to the use of such food as bad fish, sausages, Madras pork, ill-ground and half cooked ragi, &c., and the first dejections of many of them contained half-boiled horse-gram.—*See Appendix* II.

Pathology.—This report has already extended to too great a length to render it convenient for me to enter at all upon this subject. All that I could say, however, would be but negative. It would occupy too much space and time to enter into the arguments which appear to me to be opposed to Dr. G. Johnson's views, or to the electrical theory which Mr. Wilkins* supports, or to some other theories which have been advanced. I am in hopes that Dr. Lionel Beale's investigations with the aid of the microscope furnished with an object class of one-fiftieth of an inch focus will be the means of throwing some light upon the pathology of cholera.

**The Etiology of Cholera*, Madras Quarterly Journal, No. 20 page 321.

Morbid Anatomy.—No post mortem examinations have been held of any of the cases occurring at the General Hospital. Many circumstances have conduced to this. The subjects are speedily removed and buried. The people in general are prejudiced against autopsies. The contagion theory is so far accepted, that medical subordinates and students are prejudiced against the performance of necroscopies. And lastly, the time at the disposal of a medical officer of the General Hospital, with a large clinical class to instruct, is so occupied with important and absolutely necessary duties, that he has no leisure for the prosecution of investigations which, under existing circumstances, must be considered of secondary importance and necessity. There are ample records of the general appearances presented by persons dead of cholera in all its stages, so that nothing less than very careful and minute examination would be of any avail. And there is no one at the General Hospital who, during an epidemic outbreak, would have leisure for such minute inspection; an argument in favour of the appointment of a Special Demonstrator of Morbid Anatomy.

Treatment.—An analysis of Table II furnishes the following results:

TABLE VII., *showing the result of different methods of treatment practised at the General Hospital, Madras, in* 114 *cases of Epidemic cholera, July 4th to October* 31*st*, 1866.

Mode of Treatment.	Cases.	Recovered.	Died.
1 Small, oft-repeated doses of Calomel with moderate stimulation	26	12	14
2 Do. do. after operation of a salt Emetic	12	5	7
3 Do. do. do. with saline Drink	16	10	6
4 Salt Emetic and saline mixture	30	17	13
5 Do. do. with hot stimulants	7	6	1
6 Food with hot stimulants	7	7	...
7 Acids; nitric, sulphuric and acetic	6	2	4
8 Chlorodyne, Omum, Sp. chlorof. and Opium	9	3	6
9 Nothing. (Died in 5 minutes)	1	...	1
Total	114	62	52

The above table taken by itself has such trifling value that I have not considered it necessary to strike the per-centages of recoveries and deaths. The information contained in this table is best taken first-hand from Table II, where the results of treatment may be contrasted with the state of the patient on admission, &c. And, further, it must be observed that these different methods of treatment were put in practice at different periods of the epidemic; those that appear most favourable having been practised chiefly when the epidemic was on the decline. And under the law of epidemic influence previously alluded to, it may happen that the favorable results have been less due to treatment, than to the natural tendency in epidemic outbreaks to a gradually declining severity of the cases and a consequent larger proportion of recoveries.

I proceed to notice these different methods of treatment in detail, so as to give my own impression as to the results.

Acids.—No. 7 in the table. These remedies were exhibited in but six cases; four of these were hopeless on admission. The other two were mild cases, one not collapsed, the other only partially so; in the latter, stimulants and nutritive enemata were combined with the acid. I have no faith in the remedial power of acids in confirmed cholera, but I have the greatest confidence in them when used to check diarrhœa, especially that flux which is so common just before, and during the continuance of cholera epidemics, and which is often called choleraic or choleroid diarrhœa.

In the cases just alluded to I am in the habit of using with the best effects from thirty to sixty minims of diluted sulphuric acid in two ounces of peppermint water, given every half hour, hour, or at longer intervals, according to the severity of the symptoms. Should much pain or griping be felt, from fifteen to thirty minims of tincture of opium are added to the first two or three doses. I first learnt the value of sulphuric acid in cases of this kind in 1852, when I was an attaché of the General Board of Health in London, for the purpose of studying cholera. A severe outbreak of cholera occurred at Luton, Bedfordshire, and I was requested by the late Mr. Grainger, a member of the Board, to associate myself with another medical man and proceed to the spot. We established a house-to-house visitation, and armed with bottles of sulphuric acid, laudanum and essence of peppermint, we visited all the houses of the poorer classes of the

population, the straw-plaiters, bonnet-makers, &c. &c., and we met with a vast number of cases of serous diarrhœa, every one of which yielded to this simple treatment; no case that I can recollect passed into real cholera; the outbreak of cholera was almost limited to the very unsanitary locality in which it arose; and in the course of about three weeks, we left the town, the populace being free from all disease. My experience during the last fourteen years has thoroughly confirmed that which I gained in 1852.

Chlorodyne, Omum, and Opium.—No. 8 in the table. These remedies were used with success in three simple cases, and without success in six apparently hopeless ones. I am not answerable for this treatment. The remedies were prescribed in my absence, it appearing to the Apothecary on duty that they were most suitable to the cases on admission. I have no faith in a simple stimulating and narcotizing treatment of cholera, though I fully acknowledge the greatness of the temptation to try such treatment when we see patients prostrated and in great agony. Except in very mild cases and early in the disease I think opium inadmissible. If given to any extent, it adds to the secondary symptoms, and in collapsed cases it appears to me to deepen that condition.

Calomel.—No. 1 in the table. The exhibition of small doses of calomel, from one to two grains every quarter of an hour, half-hour, or hour, till the symptoms yield, is a plan of treatment which has met with much success in the Civil Dispensary attached to the General Hospital, during the last few years. This treatment was put in practice, with less success, in the cases which occurred in the first half of the present year, and also in the first period of the late epidemic. Considering the general severity of the cases, the calomel treatment appeared to have a certain success. The drug was withheld immediately upon the appearance of biliary matter in the stools, and for a long time I attributed this appearance directly to the remedy, and I talked to my class of "mercurial purging." But subsequent experience led me to correct this notion, for I found that when no calomel was given the greenish biliary stools were the first indication of the disease having yielded, and were often speedily followed by a free flow of urine.

Emetics with Calomel.—Nos. 2 and 3 in the table. As I fancied that the treatment by calomel alone showed but a low per-centage of success, I combined it with the exhibition

of emetics, as recommended in 1832 by Dr. Ayre. Years since I had employed emetics as a commencement of cholera treatment, not with any view to elimination, but because I had observed (though by no means universally) two effects of emetics. First, I had seen distressing vomiting relieved—nay arrested, by one or two copious evacuations from the stomach; and, secondly, I had certainly seen some patients aroused from a state of collapse on the production of free emesis. Formerly I used sulphate of zinc combined with ipecacuanha, then mustard, but in the present epidemic I used the following:—

℞. Sodii Chloridi ʒiii.
Liq. Sodæ Chloratæ ♏xxx.
Aquæ font. ℥iv. *M.*

to be given at once and repeated in quarter of an hour if it does not act. The above dose for an adult. When this dose was retained for any time, I thought I detected some subsequent beneficial action, so, still giving the calomel, I also administered the following after the emetic had acted freely.

℞. Sodii Chloridi ℥ss.
Liq. Sodæ Chloratæ ʒi.
Aquæ font. ℥xxiv. *M.*

Make a drink to be consumed, in small quantities at a time, in from twelve to twenty-four hours. Possibly about this time the cases were becoming milder, but it appeared that this treatment was affording a fair success. But so many of the patients suffered salivation after recovery from collapse, and I believed in greater proportion since I had used the above salines, that I determined to omit the calomel.

Emetics and Salines.—Nos. 4 and 5 in table VII. Every case was now treated on the following plan. On admission a salt emetic was given until it acted freely, and I may here state that this was almost always followed by a cessation of the vomiting. The following was then prescribed:—

℞. Sodii Chloridi grs. xxx.
Sodæ Carbonatis grs. xx.
Potassæ Bicarbon. grs. x.
——— Chloratis grs. x.
Sodæ Phosphatis grs. xv.
Liq. Sodæ Chloratæ ♏xx.
Aquæ font. ℥ii. *M.*

to be given every half hour to six or eight doses. I very

soon found I was giving the salines in too large doses and in too concentrated a form, so I reduced the dose from a fourth to an eighth of the above, diluted with an ounce of water. At first so many very bad cases recovered under this treatment that I was very hopeful of meeting with a large success, and if I had not had so prominently before me the fact that under the epidemic influence cases do gradually become milder and less fatal, I should have thought that this saline treatment was the most promising that I had met with.

Some failures then occurred, and as I had interdicted stimulants, I began to consider whether these latter might not be combined judiciously with the salines. I had seen no benefit from stimulants given in large quantities, or administered cold ; so I gave small quantities in hot water sweetened. In some cases port-wine negus was given, but generally a dose of two or three drachms only of brandy, well diluted with hot water and sweetened with sugar, was administerted every two, three, or four hours. Under this treatment, *towards the end of the epidemic,* a marked success was met with.

Food with Hot Stimulants.—No. 6 in the table. Table VII would seem to show that this was the most successful of all the methods tried. But the cases are few and the treatment was practised late in the epidemic. Two of the seven cases were mild ones, five were tolerably severe, the patients being partially or completely collapsed ; in one, coma supervened ; yet all recovered. The kind of food employed was, in the first instance, hot arrow-root or sago congee and hot weak chicken broth ; the stimulants were used in very small quantities, sometimes they were mixed with the broth and congee, sometimes given separately diluted with sweetened hot water. As recovery took place, solid food was cautiously and gradually given. The milk diet of the hospital afforded a useful method of gradually introducing solids.

Castor Oil.—I have tried castor oil, always without success. I have not before me the means of stating in how many cases of Cholera I have used this remedy, but it was exhibited in three of the cases under review ; (it has been accidentally omitted from the treatment column of table II., in one of the earlier cases.) I find the oil whether given plain or in emulsion, nauseates the patients, and very often keeps up the vomiting. I am unable, as at present

informed, to appreciate the soundness of the theory which led to the suggestion of castor-oil as a remedy. I cannot believe that the cholera poison is to be eliminated by purgatives.

General Therapeutics. *The Use of Heat.* I have no experience of the cold douche, the hot-water bath, or hot vapour bath. The former appears to me inadmissible; I have no objection to heroic remedies, but I fail to comprehend how a person is to be restored from the collapse of cholera by a thorough drenching in cold water. We have no facilities at the General Hospital at present for the speedy preparation of hot water and hot vapour baths; but did they exist, it would require some tolerably certain evidence of the benefit of these baths before I could be induced to use them. I fear they would but add to the prostration. I certainly apply artificial heat, but only dry. My patients are well rubbed with the hand; turpentine being used as much to prevent the effects of friction as for its stimulating properties. The sufferers are then well covered with blankets, and bottles filled with hot water are applied to the feet, to the inner and outer sides of the thighs, to the sides of the thorax and to the axillæ.*

I am confident that very many of my patients derived very great benefit from the external application of dry heat. And I am afraid that the antiphlogistic theory still clings to us with such tenacity that we often neglect this very useful addendum to restorative treatment.—*See Appendix III.*

The Relief of Thirst.—There can be no doubt that urgent, unconquerable thirst is one of the most prominent and most distressing symptoms of Asiatic cholera. The sufferers are clamant for cold water, and we are told that it is "actual cruelty" not to indulge the craving. I am not sure about the cruelty. But I am sure that no amount of cold water will relieve the symptom: the water is greedily swallowed and again it is craved for: it is

> "As if increase of appetite had grown
> By what it fed on."

The fluid, if taken in large quantities, is immediately vomited, and if in smaller quantities, it accumulates in the stomach

* Since the above was written I have had tin cases made for the application of dry heat. They reach from the axilla to the hips and are hollowed on the face to fit to the lateral aspect of the thorax.

until the distension of the organ causes its rejection. And this keeping up of constant vomiting appears to me to increase the depression and collapse, without the patient being in the least relieved of thirst. I may be reminded that I have advocated the use of an emetic. This is quite true, but the full and efficient action of a speedily acting emetic, in my experience, controuls the vomiting, whereas large draughts of cold water keep it up. It is difficult to persuade oneself that the thirst of cholera is not to be relieved by cold water, or by sucking ice, but I have arrived at this persuasion. It is difficult also to persuade oneself that the internal burning heat of which patients complain is not to be relieved by iced-fluids; but I have arrived at this persuasion also. The thirst and internal burning heat disappear completely when the circulation and the secretions are restored, and it is my conviction that both are most relieved by small quantities of warm fluids, which may be either thin congees or weak broths, or well-diluted stimulants. Some time since I suggested to the authorities the advisableness of hospitals being supplied with tins of concentrated soup, which by dilution with hot-water, would afford a suitable nutriment very readily prepared on emergencies. The Principal Inspector General has ordered Indents to be sent in for supplies of Liebig's Extractum Carnis, and I believe that the nutritive properties of this preparation will be found of great avail in cases of cholera. The prepared soup should be given warm and well diluted, for concentrated preparations are not absorbed. When vomiting obstinately persists in spite of remedies, thirst may be greatly allayed by warm enemata of beef tea, or any broth, to which from a quarter to half an ounce of brandy and a drachm of the Liquor Sodæ Chloratæ have been added. I do not remember that any of the patients who were treated with the compound saline draughts previously referred to complained that these draughts increased their thirst. No particular notes are recorded on this point, but my impression is that the thirst was relieved, the vomiting being arrested. One would not have been surprised had an increase of thirst been experienced when these draughts were taken, considering the quantity of chloride of sodium which they contain. Most probably the carbonate of soda and bicarbonate of potash relieve the thirst.

The Treatment of Obstinate Vomiting.—I have already mentioned that I have generally found vomiting to cease

soon after the full operation of a speedily acting emetic. But this is not always the case, and, as the continuance of vomiting tends to deepen the prostration of the patient, it becomes necessary to endeavour to check it. The effervescing tartrate of soda, or citrate of potash, of ammonia, or of magnesia, will sometimes give relief. Two or three minims of Scheele's hydrocyanic acid may be added to each draught. When these means failed, which they often did, I found benefit from the following :—

℞. Creosoti ℥iv.
Sp. Chloroformi ʒii.
Acidi Hydrocyanici Diluti (Scheele) ℥ viii.
Syrupi ʒii.
Misturæ Acaciæ ʒss.
Aquæ font. ʒiii. *M. ft. Mist.*
A fourth part every hour or two.

When vomiting continues, or recurs, after the secretions have been restored, it very frequently is associated with hiccup. I have tried various antispasmodics, both alone and combined with the above creosote mixture, and often have been much chagrined to find the symptoms persist. I have then pursued the following course, with success. A blister of two or three inches diameter has been quickly raised by the application of the liquor vesicatoria over the scrobiculus cordis. The cuticle has been immediately removed and the raw surface sprinkled with hydrochlorate of morphia, commencing with a sixth of a grain and gradually increasing the quantity whilst carefully watching the effects. Somnolence is frequently associated with these symptoms, so that this practice requires to be carried out with an intelligent caution.

Treatment of Suppression of Urine.—In many cases the renal secretion is not restored for some hours after the other urgent symptoms have passed off and the stools have afforded evidence that the suspension of the hepatic function has ceased. There can be no doubt as to the pathology of suppression of urine—congestion of the kidneys. Should the congestion continue after apparent improvement as regards the other symptoms, special treatment must be put in practice. Such mild measures as the application of sinapisms, hot fomentations, turpentine stupes, &c. may be tried; should they fail, dry cupping will often succeed. I have seen several patients pass their first few drops of urine since the

attack, whilst the cupping glasses were on the loins. Should dry cupping fail, I do not hesitate to apply the scarificator, and I have never known this to fail, provided the case was in an otherwise promising condition.

I have bled from the arm in a few cases; in two for general relief, especially of dyspnœa. In one case, then apparently moribund, I opened a vein in both arms and with great difficulty withdrew about five ounces of black, tarry blood; the patient died whilst the arms were being bandaged. In the other case the dyspnœa was decidedly relieved, and although the patient ultimately recovered, yet he suffered from marked symptoms of uræmia, and his convalescence was very prolonged. The latter case, with others which had occurred to me before, make me chary of general bleeding in cholera.

It behoves the practitioner to be quite certain that his patient is actually suffering from suppression and not merely from retention of urine. I always examine the abdomen, and if there is the least dullness elicited on percussing the hypogastric region, I use the catheter. In the case of a somewhat hysterical young woman there was prolonged somnolence, and I found the bladder quite distended: catheterism had to be resorted to twice daily for three or four days; it was in this case that an eruption of erythema punctatum was observed.

The Relief of Uræmic Symptoms, Somnolence and Coma.—These symptoms sometimes set in without the urinary secretion having been restored, and such cases are, for the most part, fatal. But sometimes they occur at a later period of the disease when the patient has been apparently progressing favourably. Under the latter circumstances the urinary secretion, which may have been quite freely passed, again becomes suspended, and the condition is very frequently attended with constipation of the bowels. There may be some warmth of skin, but in India it is seldom, according to my experience, that any decidedly febrile action occurs; the pulse generally is slower than in health. In these cases prompt treatment is absolutely necessary. To put faith in the *dolce far niente* theory—to trust to the unassisted powers of nature, is simply to allow the patient to pass from threatened, to certain, death. I think it well that the mind should be disabused of the idea that inflammation has happened in these cases; the condition is one partly of blood

poisoning and partly of congestion which, if not relieved, will certainly lead to effusion of serum. It appears to me then unnecessary to resort to calomel with a view to obtaining its antiphlogistic effects. If there is any injection of the conjunctival vessels, with tendency to somnolence, the plan I pursue is to apply a cantharidine blister or the liquor vesicatoria to the nape of the neck, and hot fomentations or a hot epithem to the loins. If the bowels have not been moved for fully twenty-four hours, their action should be solicited. I do not think it matters what kind of purgative is selected, but I prefer from ten to thirty grains of rhubarb or jalap with from five to ten grains of chlorate of potash suspended in two ounces of any aromatic water. Should no action of the bowels occur in two or three hours, the dose is repeated, and its action quickened by the administration of a large injection of warm water with half an ounce of soap liniment and two or three drachms of tincture of assafœtida. I do not use turpentine because this drug has intoxicating effects upon some persons, and as we do not know how the patient may be affected as regards this idiosyncrasy, it is but prudent to guard against the chance of producing any such effect.* The bowels having been well cleared out, I either resume the cholera saline draughts, or give chlorate of potash and spirits of nitrous ether in moderate doses; to which, in suitable cases, small doses of quinine dissolved in hydrochloric acid are added.

If the patient has been taking solid food, this must be omitted, and congees and broths given in sufficient quantity to keep up due nourishment of the body. If the pulse is slow, soft and small, and there is a tendency to dryness of the tongue, moderate stimulation by alcohol is needed. But the question of when and how to give or withhold stimulants is one which can only be determined by the medical attendant watching the case, who must stand by prepared "to obviate the tendency to death." I am convinced that by such a line of treatment as I have here sketched, many persons have been restored from such a comatose condition as gravely threatened life.

The Relief of Dyspnœa.—I have tried various remedies with a view to the relief of dyspnœa. Externally, sinapisms,

* I have suffered from the intoxicating effects of turpentine, and the misery I endured has rendered me unwilling to submit others to the chance of similar suffering.

hot thinly-spread cataplasms, and turpentine stupes to the thorax. Internally, antispasmodics, stimulants, and sedatives, as valerian, ether, ammonia, hyoscyamus, &c. Certainly in many cases relief has followed, but I fear that the *post hoc ergo propter hoc* argument has had its influence in this matter, for the symptom has passed off in other cases in such a manner as to make me suspicious of how far my medicaments have ever relieved or removed dyspnœa. I must not mount a hobby, but I think the general influence of the saline draughts and the special influence of hot brandy and water have given relief to this distressing symptom.

Hygiene.—At the General Hospital the cholera patients are treated in a separate building completely isolated from the body of the hospital. This building is made of bamboo mats and is thatched with cadjan leaves and straw. It is the northern half of what was formerly used as the Civil Dispensary. At the commencement of the epidemic the building was somewhat dilapidated, having been allowed to fall into disrepair as there was some doubt whether it would be required when all the wards of the recently-enlarged hospital became available. But the outbreak of Cholera soon settled this point, and the building was speedily put into thorough repair, and its floor was asphalted. It is very lofty and airy; the very materials of which its walls are constructed, with well-arranged doors and windows, provide for perfect ventilation. It is divided into four wards, each about 30 × 18 feet, so as to allow of segregation of the sexes and races. It may appear strange that one speaks of segregation of the races when so catholic a disease as cholera is alluded to, but it is a fact, nevertheless, that native patients would not resort to hospital unless they knew that they would be treated in wards specially devoted to their race. Notwithstanding the shed-like appearance of the building, experience has proved that it is admirably adapted for a hospital. Its adaptation to the accommodation of cholera patients is shown by the fact that during the epidemic there has not been a single instance of spreading of the disease to any of the friends of, or attendants upon, the sufferers; and, in the case of children, their mothers or other near relatives have been allowed to remain with them night and day. Fortunately the number of patients present in the wards at any one time during the continuance of the epidemic has never been such as to lead to any over-crowding.

Perhaps it is partly to this circumstance and to the good ventilation of the wards that a greater mortality was not experienced.

Disinfectants.—Whether fresh cholera discharges are, or are not, infectious, there is a propriety in cautiously dealing with them. The following are the regulations in force at the General Hospital :—

Every patient on admission is placed on a taped cot, the tape being so arranged as to afford a convenient aperture for the passage of the dejections. Clean vessels are supplied for the reception of the discharges (from both stomach and bowels) first passed after coming to Hospital. When the nature of the evacuations has been ascertained by inspection by a competent person, the vessels used during the remainder of the illness are dusted freely with McDougall's powder (a mixture of carbolate and sulphate of lime with some free lime). Immediately after inspection the discharges are buried, thrown into a hole and covered with a layer of fresh earth. McDougall's powder is freely sprinkled under the cots and on the tape and bed-clothes with which the patients are supplied. Thus the atmosphere of the wards is strongly impregnated with the peculiar odour of the disinfecting powder ; and I am of opinion that this has a decidedly beneficial effect upon the patients, and, as before remarked, it may be that it had some effect in preventing the spread of the disease to the friends of, and attendants upon, the sick.

The clothes which patients bring with them to Hospital are taken from them, steeped in a tub of water through which a quantity of McDougall's powder has been diffused, and then well washed and stowed in a separate chamber until required. There is one disadvantage in this use of the disinfecting powder, viz., the quantity of lime it contains is destructive of the materials soaked in the mixture ; the fibre, whether woollen or cotton, becoming so rotted that the cloths easily tear. As soon as pure carbolic acid is obtained at the General Hospital in sufficient quantity, I shall experiment to ascertain whether it has not all the disinfecting, without any of the destructive, properties which McDougall's powder possesses.

In bringing this report to a close, I beg to mention that I am aware that the impressions and opinions expressed are based quite as much on experience previously gained as on

that of the late epidemic, upon the observation of which the report professes to be founded. But I have really endeavoured to confine myself to actual occurrences and to avoid speculations of any kind whatever.

It is a matter of great regret that notwithstanding the vast amount of actual knowledge of cholera which has been attained, there is, nevertheless, so little definitively known of its pathology, and that as regards the *methodus medendi* one is almost forced to acknowledge the truth of Dr. Belcher's* remark that "although some cases recover, Pestilential Cholera is not amenable to treatment."

I should fail in my duty if I did not here acknowledge the indebtedness of my patients and myself to the fearless and conscientious manner in which the Medical Subordinates, the Medical Students in charge of the cases, the ward-coolies, and the extra attendants engaged to minister to the wants of the sufferers, carried out the instructions given to them. My anxiety about the patients was greatly relieved by the confidence I had that during my absence from Hospital, they would be kindly, skilfully, and carefully tended.

APPENDIX I.

Predisposition to attacks of Cholera.

I have alluded to the age and constitutional condition of my patients, because in my late readings I have met with two opposite opinions upon this point. Sir Ranald Martin† says, "Although it be quite true that the cholera poison requires no definite predisposing conditions in the system to enable it to produce its effects, and that it *proves fatal at all ages*, and nearly equally so to both sexes, and that neither the weakness of infancy, the vigour of manhood, nor the decrepitude of old age, are a safeguard against its inroads;—still, in common with fever and dysentery, it may be truly said that *whatever depresses the constitutional powers* will predispose to the invasion of cholera, as the use of crude, indigestible or ill-prepared food,—fatigue, want, filth and misery,—but above all, intemperance in the use of spirituous liquors, so common to the lower orders of English in all parts of the world."

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* *The Lancet*, September 1st, 1866, page 232.

† The Influence of Tropical Climates on European Constitutions. Edition 1856, page 300.

Mr. Wilkins, on the other hand, tells us in his paper "On the Etiology of Cholera"* that :—

"Vigour of body predisposes to cholera. This is a fact which nobody having any experience of the disease will deny. We have statistical proofs also that this is the case. Dr. Balfour, (now Inspector General of Hospitals of the Hyderabad Subsidiary Force) in his statistics of cholera, remarks :—'One race of men is more susceptible to the influence of the cholera agent than another. The European Soldiers, for instance, are much more frequently attacked with it than their native comrades, and the Madras Native Troops have lost more of their strength than the native soldiers either of Bengal or Bombay.'

"The General Board of Health in their report of the epidemic cholera of 1848-49, state—'A very large proportion of its victims were in the prime of life. Out of 2,322 attacks and 1,058 deaths occurring at Glasgow in which the ages were carefully taken, the numbers attacked between 20 and 40 (1,148) were more than double those up to 20 ; between 20 and 50 the numbers more than doubled those who suffered in all the other periods of life put together.'

* * * *

"Dr. Balfour remarks also,—'That the older soldiers have been less frequently attacked than the younger men.' This immunity enjoyed by those advanced in age who are, it will be admitted, generally wanting in vigour, is observed among all classes of people. It is seldom, comparatively speaking, that we hear of an old man or woman being attacked with the disease."

Now, I must at once say that I am entirely with Sir Ranald Martin, and this not merely from the puny tables presented in the foregoing report but from what I have observed of the disease since 1848.

I conceive that there are under-currents of error in Mr. Wilkins's application of the statistics he brings forward.

1. Mr. Balfour's statistics referred to are those of soldiers only ; and although one would not for a moment dispute

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* Madras Quarterly Journal of Medical Science, No. XX. October 1866, page 325.

their correctness as to European troops suffering more severely from cholera than their native comrades, yet one may fairly ask whether, taking all circumstances into consideration, this may not, to some extent, be accounted for. Cholera outbreaks, for the most part, occur upon the line of march. European Soldiers in cantonments have airy barracks, and sleep on cots, their meals are regular, and they are little subject to fatigue. On the march, they occupy somewhat crowded tents, sleep on the ground, their meal-hours are less regular, they are often fatigued, and they are incautious of exposure, &c. Whilst Native Troops on the march have their habits and mode of life comparatively but little changed.

2. The statistics being those of soldiers only, do not give us any information as to how the general civil populations fare in the districts through which the troops are passing,—how many villages are stripped of their inhabitants,—nor how many of the camp-followers,—children, men and women, able-bodied or infirm,—are entombed at the different halting stations. I presume that, with few exceptions, medical men who have marched with Regiments, either European or Native, which have been stricken with cholera, will acknowledge that the number of unrecorded cases among the camp-followers which they have been called upon to administer to, has exceeded the number of recorded cases among the troops.

3. As to the Glasgow statistics. That city has a most unenviable notoriety for containing a larger number of dram-drinkers to excess, than any similar-sized city in the whole of Her Majesty's dominions. And it may be safely concluded that a larger proportion of these whiskey-tipplers will be met with between the ages of 20 and 50 than at any other time of life. And I believe with Sir R. Martin that habitual intemperance does give a predisposition to suffer from cholera.

Again, these statistics are defective, in as much as there is no comparison drawn between the numbers attacked and the numbers living at the different periods of life.

4. "The older soldiers have been less frequently attacked than the younger men." On a reference to the Army Statistical Reports, I find that, in India, the relative mortality (from all causes) to strength is generally higher among

soldiers of over 40 years of age than among those below this age. The returns, however, only give the strength and mortality at the different ages, and not the number of admissions into hospital, so that there are no data by which to judge of the relative liability to sickness. In the foregoing report I have alluded to the fact that the experience of both Dr. vanSomeren and myself during the late epidemic is opposed to the view that cholera has a special proclivity to avoid young children and elderly persons, and to seize only on adolescents and adults in the prime of life and in full vigour of constitution. Although I have no statistics to support the opinion, I really think that some explanation may be afforded of the statement that "the older soldiers have been less frequently attacked than the younger men." There is a well known law of endemic diseases—especially of those due to malaria—namely, they have a tendency to attack new comers and strangers with great severity, whilst permanent residents, though their health may be seriously damaged by the endemic influence, have a comparative immunity from attacks of specific disease. I believe that the same is the case with cholera. During the late outbreak, out of 71 native patients 22 were strangers to Madras, persons recently arrived from various towns and villages at a distance, and they were attacked immediately on coming under the epidemic influence. Besides the 22 natives there were other instances of strangers being attacked; one European had but recently arrived from up-country; one Eurasian lad, entered as from New Town, had arrived from Bangalore the day before he was attacked; two members of a Eurasian family from Poonamallee, entered as from Black Town, had only been in Madras a few hours before being seized with the disease, having come down to see a relative off by a steamer. It is well known to almost all the medical practitioners in this city that a great many persons newly arrived at Madras, some from Mofussil stations, some from England, were attacked with cholera during the late epidemic. I have repeatedly mentioned instances of this kind to my colleague, Dr. Paul, and his recognition of the fact has been shown by his questioning reply, " Is it not strange how the dire influence tells upon new-comers ?" And thus it may happen that the general result " the older soldiers have been less frequently attacked than the younger men," is due to the circumstance that many of these younger men are quite recent arrivals in the

country, and therefore have a greater proclivity to suffer from the disease than their better-seasoned comrades. This must not be taken as an argument in favour of the "vigour of constitution" theory, because it by no means follows that young soldiers have greater vigour of constitution than the older men, for loss of vigour results in invaliding, and it is seldom that we see really old men in the ranks of a European Regiment. Besides I have before shown that the vigour of constitution theory is decidedly "not proven."

I have recently met with some interesting remarks on cholera, by Dr. Belcher,* Physician to the St. George's-in-the-East Cholera Hospital. This gentleman has attended over 300 cases, and he follows Dr. Copland's division into four varieties, namely, Cholera biliosa, C. flatulenta, C. spasmodica and C. morbus. I acknowledge the propriety of this division, but the first two varieties find no place in my tables; when met with at the Madras General Hospital they are returned as Diarrhœa Choleraica. I quote the following from an epitome of Dr. Belcher's remarks:—

"The persons attacked with cholera biliosa were generally of the middle age and robust. The greater number had led irregular lives, were of intemperate habits, or intoxicated when attacked. . . . Cholera flatulenta occurred chiefly among the aged, debilitated and ill-fed. . . Cholera spasmodica occurred chiefly among young adults and the middle aged—comparatively rarely among the aged. . . . . Cholera morbus, Asiatica or pestilential cholera represented the type of a large number of cases. This variety occurred chiefly among the aged, though it spared neither age nor sex. At least two-thirds of all the cases of cholera under Dr. Belcher's care were females and Irish. When this variety occurred among others than the aged, it was the half-starved, dirty, ill-fed, squalid children of poverty who were as a rule the victims. They lived in dens of filth and wretchedness, the stench of which was stifling. The majority, indeed nearly all, of those attacked by this variety died. The mortality was greatest in that part of the parish polluted by bone-houses and soap-boiling premises, and by a

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* *The Lancet*, September 1st, 1866, page 232.

dust-yard, the effluvium from which is proverbial, for there all kinds of vegetable matter and filth from various parts of London are deposited to rot and contaminate the atmosphere. Dr. Belcher is of opinion that the true Asiatic cholera does not admit of cure. In his experience, every kind of treatment that has been advocated and vaunted has proved to be a failure. No reliance, he says, can be placed on any specific mode of treatment in this variety, more especially in the severe form. The main thing is good nursing. . . . The first three forms of cholera Dr. Belcher thinks may be looked upon as amenable to treatment, but not infectious; but the Asiatic variety, he believes, is undoubtedly infectious, and not amenable to treatment, though some few may recover."

Since the foregoing report was written I have received the first volume of *A System of Medicine, edited by Dr. Russell Reynolds*, and I quote the following remarks from an exhaustive article on Epidemic Cholera, by Dr. Goodeve.

"*Influence of Age.*—Mr. Grainger states that the liability to fatal attacks increases after the age of fifty in both sexes; the ages from five to forty-five having the lowest comparative mortality. In India in 1861 the influence of age was hardly perceptible. According to Dr. Gull, in England it was most fatal to those under one year and over fifty-five, corresponding indeed, with the general tendency to mortality in England.

"*Residence in India.*—It has been thought Europeans of short residence in India were more liable to suffer than those of long residence, but the opinion does not seem to have been formed upon any well-ascertained facts. The Committee for the epidemic of 1861 investigated the matter for that outbreak, but they consider their data too imperfect for forming opinions. They say 'We can base no conclusions upon the figures shown in this table. The soldiers whose period of service was shortest apparently suffered the most. The proportion of deaths to strength falls from 7·7 per cent. among men of less than two years Indian service to 3·5 per cent. among men who have served more than ten years. . . . The proper investigation of this subject must be left to future observers.' It will probably be found that the influence exercised by length of residence in India upon the liability to Cholera is as little important as that of the other

predisposing causes that have been already noticed." Page 135.

I think it only fair to give this extract here in order that it may be contrasted with what I have said on a previous page, written before I read Dr. Goodeve's article. The opinion expressed in the last sentence of the extract is quite opposed to that which I entertain, and have mentioned, as to the influence of a short residence upon liability to cholera. And it appears to me opposed to the only fact actually ascertained by the Cholera Commission of 1861 on this subject, namely, that "the proportion of deaths to strength falls from 7·7 per cent. among men of less than two years Indian service to 3·5 per cent. among men who have served more than ten years." In order to appreciate the full force of the above per-centages, it is necessary to contrast them with those from all diseases in the army. I have therefore again referred to the *Army Statistical Reports*, and in the volume for 1863, pages 153 and 159, I find the following tables:—

"*On the Influence of Age on the Mortality.*

	Under 20 years.		20—24.		25—29.		30—34.		35—39.		40 and upwards.	
	Strength.	Died.	Strength.	Died.	Strength.	Died.	Strength.	Died.	Strength.	Died.	Strength.	Died.
Bengal.	1,339	13	16,491	305	15,212	468	5,642	190	2,301	100	466	25
Madras.	599	2	3,958	59	4,871	118	1,853	52	878	27	188	14
Bombay.....	387	1	4,128	33	4,863	68	2,228	54	1,063	29	250	11
Total..	2,325	16	24,577	397	24,946	654	9,723	296	4,242	156	907	50
Ratio of Deaths per 1,000 of Strength..	6·88		16·15		26·22		30·44		36·77		55·13	
Do. Bengal 1862, Madras & Bombay 1861-2.	4·23		18·67		23·67		33·84		39·82		46·43	

"The results correspond closely with the average of the preceding period, and illustrate the influence of tropical climates upon the constitution, the mortality increasing with age in a much more rapid ratio than in temperate regions."

"*On the Influence of Length of Service on Mortality in the Army.*

"*Ratio of Deaths per* 1,000 *of Strength.*

Length of Service.	1 United Kingdom.	2 Mediterranean and British America.	3 West Indies, St. Helena, Cape, and Mauritius.	4 Australasia.	5 Ceylon, China, Madras, and Bombay.	6 Total.
Under 5 years....	4·60	4·21	5·90	18·00	13·45	6·44
5 to 10 ,, ...	8·71	9·61	15·36	18·08	23·89	13·46
10 to 15 ,, ...	12·50	7·63	12·35	24·21	21·00	14·25
15 to 20 ,, ...	19·75	25·95	19·23	29·80	40·84	25·20
20 and upwards.	14·81	28·20	52·63	30·77	30·30	19·63
Total.....	8·13	7·57	10·11	20·15	21·04	11·08

"The ratio of deaths is much below that given in the general summary, as the regiments serving in Bengal are unavoidably omitted from this table."

The first of these two tables I have reproduced here to afford proof of the statement I made that, in India the mortality among soldiers of upwards of 40 years of age is greater than that of those below this age. And although the Bengal returns are omitted from the second table, it will serve the purpose for which I have introduced it, namely, to contrast the general mortality according to length of service with what is known as to the special mortality from cholera, according to length of service. I take the ratios given in column 5 and reduce them to per-centages. Then accepting the mortality under 5 years of service as representing that under 2 years of service, we have the following results :—

British Army in India.	Under 2 years of Service	Above 10 years of Service.
General mortality per cent.	1·345	2·962*
Mortality, per cent. from Cholera, as per Commission of 1861.	7·700	3·500.

Unless service in India under 2 years, or, what is equivalent to this, recent arrival in the country, does predispose to attacks of cholera, I am quite unable to arrive at any explanation of the above discrepance in mortality.

* This is the accurate per-centage and is thus found ; as Strength above 10 years (5266) : 100 : : Mortality above 10 years (156) to 2·962.

APPENDIX II.

The Mode of Propagation of Cholera.

Again I quote from Dr. Goodeve's article :—

"*Diffusion of Cholera.*—Although it is probable that cholera is spread by human intercourse, it is indisputable that it originates in places without it being possible to trace any previous communication with infected persons. This has happened over and over again in towns and large establishments in which the outbreaks, after the greatest perseverance, could not be accounted for by any previous exposure to infection. Its appearance at St. Kilda, in the Western Islands of Scotland, is as strong an instance as can be given. This Island was cut off from all communication with the mainland, and yet the disease appeared in it suddenly without a trace of importation. In 1848 Dr. Parkes could not trace any contagious origin for the first cases occurring in London.

"*Contagion of Cholera.*—The fact of the diffusion of Cholera by human intercourse leads us to inquire how this operates, and to the question of the contagion of Cholera. Diffusion by contagion does not negative the possibility of an origin independent of infection. The majority of medical men in India, accustomed to see Cholera year after year, to be in constant intercourse with the Cholera sick, and to see the general immunity of hospital attendants and of themselves, doubt the contagiousness. Some physcians, however, think differently. It does not seem proved that contagion can exist in the shape of a volatile poison emanating from the sick, and rapidly infecting the healthy. It would not be so easy to disprove that there may not be some form of poison which may not be volatile, or which may require time to become so, or to develop its poisonous properties and capability of infection. . . . I should, as far as my own experience goes, say that Cholera does not spread from the sick to the healthy by any rapidly acting emanation. Dr. Morehead's observations support the view of the non-spreading of Cholera in Hospitals through contagion." Page 141.

And further on, treating of the *Portability of the Cholera Poison*, Dr. Goodeve makes the following remarks, which I extract piece-meal from his text :—

"We have no knowledge of the period of the disease at which contagious emanations from the sick, if there are such miasms, are evolved. Those who believe that the poison is to be found in the evacuations would consider it to be given off with the rice-water stools. . . . The regularity with which, over wide areas, Cholera epidemics advance, and the simultaneousness with which they attain their maxima and their decline, seem to imply some general law, and not a diffusion dependent upon the chances of fæcal contamination only. I think that those who have been in the habit of seeing much of Cholera will not be inclined to think that there is much potency, at all events, in the *fresh* Cholera discharges. . . . It may be that decomposing Cholera discharges may be more mischievous, as has been supposed by Pettenhofer. If, as supposed by Dr. Budd (of Clifton), the poison is multiplied so rapidly in epidemics as to suffice for the rapid diffusion which takes place in severe epidemics, it ought to be equally powerful when under observation in a sick ward. The mode in which Cholera spreads in wet weather in India, seems adverse to its diffusion by the discharges. . . . Although the specific poison of Cholera may not exist in the rice-water stools, it must be admitted that Dr. W. Budd has brought forward strong evidence in support of his views, and the facts which he adduces can, in the present state of our knowledge, be explained only upon the supposition that the evacuations of Cholera patients have, in some state or other, an influence upon the spread of Cholera. There are yet many points that require elucidation to prove that the Cholera poison multiplies in the human body, though perfectly in accordance with the cases of many other epidemic diseases, or that the specific agent is contained *pur et simple* in the rice-water stools. It would seem that they are the congenial soil for the multiplication of the poison, rather than the direct source. It would be a good thing for mankind that Dr. Budd's views should prove correct. It would then be a comparatively easy thing to prevent the spread of the dire pestilence."

It is gratifying to me to find that the conclusions as to the Contagiousness of Cholera, which I have deemed legitimate, from my comparatively limited observation, should accord so closely with those which Dr. Goodeve has arrived at from his more extended personal observation and from the examination of a much larger mass of Cholera literature than I have had the opportunity of perusing.

APPENDIX III.

The Influence of Heat.

Remembering that I had read some observations of Sydenham, strongly advocating the application of external heat in exhausting diseases, I referred to Dr. Greenhill's Edition* of his works, but could only find a general reference to the subject under the head :—

"*Adolescentulorum juxta cubantium calor his præ cæteris omnibus prodest. Cujus ratio redditur.*"

But whilst turning over the pages of Copland's Dictionary, article *Pestilence, Choleric*, I found what I wanted, and I trust that its quaintness will be an excuse for my giving the extract entire.

"*De Methodo Medendi Morbos per Accubitum Junioris. Cap.* 16. May ye 19th, 1662, I was called in ye night to Mrs. Change, whom I found very ill of a Cholera Morbus ; she had many ugly Symptoms, as coldness of the Extreme parts, talking a little idly, intollerable Sickness, & felt a tingling in her Fingers & flesh outwardly. I judge it dangerous to use Dilutients especially by Clysters in a Women (*sic*) soe green (she having not lain in a Month) & ye Disease pressing soe hard upon my heels : Soe I ordered her to take a warm Cordial, & that a good draught of it, & her Husband to lie close to her Back naked, & her sonn of 12 years close to her Belly, & to lay on more cloths & to warm her Leggs & Hands wth hot cloths : She immediately fell into a moderate Breathing and all Sympt. ceased ; & after enjoyning her to keep her bed ye next day, & to eat & drink nothing save a small Quantity of Barlybroth a day for 2 days she perfectly recoverd.

"February 1661 I was called to Mrs. Hulston, who after a very Chronical fever was fall'n into a very fatallike Diarrhea ; I saw it was to noe purpose to give astringents seeing ye Disease proceeded from a Decay of natural heat, therefore I took this Course, viz., I caused her Sonn a plump hot Lad of 13 years of age, & her Nurses sonn of 6 or 7 years to goe to bed to her naked, & to lie ye one

* Editio altera. Sydenham Society, 1846, page 55.

close to her Belly, ye other close to her Back, wch they did, & as long as they continued with her she had noe stools ; but ye Boys rising at any time ye Looseness would immediately return. I commanded that she should persist in ye Course till her cure should be compleat, (the Boys relieving one another by turns in ye day time) & soe she fully recoverd not only of her Looseness but allso of her Sickness in general.

"The very same course I took with one Mr. Little, who had a fever abt 7 weeks, & at yt time Aug. 1662, soe far spent yt his Drs judged him a Dead-man : He was ancient & having been much purged wth violent Medicaments he was as weak as ever I saw any yt recoverd ; I (having to noe purpose made attempts to lay his fever by inward Medicines & to raise his strength by Cordials) told his wife that nothing could preserve his life but ye putting a Boy to bed to him ; soe she procured a Link boy to lie very close to him all night, & ye next morning I found his fever allmost off, & his eye & countenance more lively, upon wch I pronounced all danger to be over, yett afterwards upon my giving him a Clyster & upon ye recess of ye Boy he began to relapse ; but ye Boy being gott again & I giving noe more Clysters he perfectly recoverd.

"The very same way had I cured before Bp. Monk's Lady, who was an aged Woman of a very feeble & thin habit of Body, & had an Ague wch (tho gone) had soe weakend her yt her Physician Dr. Ridgley looked upon her as dead ; when I was sent for she had allso spitten some purulent matter & blood which they shewed me (in abundance) upon ye Napkin. I told ye Dr. yt I apprehended yt nothing could save her life, but a speedy transplantation of some young Spirits upon her, to wch he readily agreed, & a Girl of 13 years was put in close to her Breast, upon this she recoverd very speedily both of her Unspiritedness & her Coughing : But ye Girl fell sick, wch was attributed to her lying wth ye Lady, tho I was confident to ye Contrary, having never known any Mischief yt way ; however she had first coming out upon her Petechiæ, and afterwards large Ulcers upon her Breech ; But Dr. Ridgley and I recoverd her."

ART. IX.—*An Examination of Some of the Principal Points in Cholera Hypotheses.* By JOHN C. DOUGLAS, Esq., Certificated, Experimental Physics and Animal Physiology, Government Department, Science and Art; National Medallist, Experimental Physics, 1861; Assistant Superintendent E. I. Government Telegraph Department.

ALTHOUGH papers innumerable have been written by those who have had the best opportunities for observation, and notwithstanding the enormous number of facts collected on the subject of epidemics in general, and those of Cholera in particular, it is a fact to be deplored that, up to this time, there is little if any unanimity of opinion as to the cause or the mode of treatment of this terrible scourge; and although it is admitted on the one hand that management may do something towards assisting nature to effect a cure, it is also denied that there is sufficient reason for assuming those treated medicinally stand a better chance of recovery than those in which the disease is left to take its course uninterfered with by medical skill.

In Medicine there are undoubtedly more useless and prejudicial hypotheses advanced than in any other science; this may be partly due to the enormous number practising medicine, compared with those studying other sciences; but I am inclined to the opinion that most of those unfounded hypotheses, emanating from men whose knowledge is beyond all doubt, result rather from a defect of the system of medical education, than from any shortcoming in the intellectual calibre of the propounders.

Statements are put forth as proved by the experience of a single practitioner in a few cases, which statements, from their very nature, could only be established as true by the united experience of hundreds of practitioners, and in the proof of which many thousands of cases would be necessary to eliminate the disturbing causes.

The requirements of a sound medical education are not summed up in the two items—a trained power of observation

and a memory to retain a knowledge of the proper application of remedies, although these qualifications appear to be almost *the only ones* insisted on by examiners, and (in many cases) possessed by practitioners. These qualities are certainly sufficient in the majority of cases in which their possessor only desires to apply the facts discovered by others; but should he wish to add to the store of knowledge already possessed by mankind, in addition to applying this store to the relief of suffering humanity, then there can be no difference of opinion as to the necessity for a careful exercise of the reasoning powers being made to form a portion of the training necessary to complete the professional education of the future medical man.

I have no doubt that I shall by some be considered as having made rash charges in thus pointing out what I believe to exist as a defect in Medical Professional Education. But I appeal to the numberless, useless theories in circulation; the manner in which remedies are brought forward as infallible, to be rejected almost immediately as worthless; to the differences of opinion amongst the profession generally upon matters admitting of direct proof by an appeal to observation; finally I appeal to the Calendar of the Madras University, to find that no mention whatever is made of the necessity for a knowledge of logic in the candidate for a degree in medicine. It may be urged that the treatment of disease, which the student observes as a student, involves continuous application of the Laws of Inference, and that, if the University does not insist upon logic as logic, it insists upon other subjects, which by the training they afford the logical faculty, well perform the function of a knowledge of logic proper. But to these objections, I would reply, the student would be benefited by a knowledge of the laws which govern his inferences; that this knowledge would save him from numerous errors if given him during his student-ship, instead of letting him know that while others obey its dictates, he can exercise his faculties when he has life or limb depending upon the correctness of his inferences; and I cannot see an exercise adequate to the exigencies of the case, in all the inferences being, as they are generally, drawn for the student by the Professor; yet this is the only way possible to convey the strictly medical knowledge required to be conveyed.

"But, by knowledge is understood the mere possession of

truths;" while, "by intellectual cultivation or intellectual "development, the power acquired through exercise by the "higher faculties of a more varied, vigorous and protracted "energy." *(Hamilton's Metaphysics, vol. 1, page 8.)* Is this "Intellectual Development" cultivated in a medical student by his teacher drawing inferences for him, or in other words by teaching him the bare facts of medical science? To the second objection, I would reply, I find that to obtain a degree in Medicine, in the Madras University, the candidate is required, in addition to his strictly medical examinations, to pass the Matriculation Examination, and to translate an exercise from the first four Books of "Celsus de Medicina." On examining the Matriculation Examination papers, I find the Arithmetical and Algebraical papers are worthless for the grand purpose of Mathematical training, as in no one question in either of these papers is any demonstration required, or pointed out as desirable. In Euclid, the examination is as it should be, in an entrance examination, easy, and in the Languages a good memory and a good grinder would certainly render the elementary knowledge of them required, ill-fitted to supply the means of mental culture to medical students.

I am of opinion that it would be highly conducive to the increase of knowledge, if every scientific teacher introduced or concluded his elementary courses by a discourse on the method of the particular science it is his profession to teach; and by leading his pupils to a correct estimation of the values of the hypotheses employed. The latter (I am sorry to have to so record my experience) is too often neglected, and hence the prevalence of an unduly high valuation of hypotheses, which are too often regarded as true, while they are in reality illegitimate; and an injurious multiplication of, and adherence to, hypotheses, which, instead of being regarded as instruments for use in the attainment of knowledge, are too often regarded as knowledge itself.

That I am the first to point out this failing in our educational system, I do not pretend; it has been pointed out over and over again, but is far from having been generally recognized. This teaching of the Medical Sciences merely empirically or experientially does not apply to all; and Professor Huxley and Dr. Carpenter are notable instances of philosophical teachers, concerning the necessity of a knowledge of the laws of inference. J. S. Mill *(Logic, vol. 1,*

§. 6, *page* 10) says, "Mankind judged of evidence, and "often correctly, before logic was a science, or they never "could have made it one. And they executed great "mechanical works before they understood the laws of "mechanics. But there are limits both to what mechanicians "can do without principles of mechanics, and to what "thinkers can do without principles of logic. A few indivi- "duals may, by extraordinary genius, anticipate the results "of science; but the bulk of mankind require either to "understand the theory of what they are doing, or to have "rules laid down for them by those who have understood "the theory." Is the latter condition fulfilled in the ordinary education of the medical student? And the following extract from the same section seems to me generally applicable to medical science. "And if several of the more "difficult sciences are still in so defective a state; if not "only so little is proved, but disputation has not termi- "nated even about the little which seemed to be so; the "reason perhaps is, that men's logical notions have not yet "acquired the degree of extension, or of accuracy, requisite "for the estimation of the evidence proper to those particular "departments of knowledge." The disputes in medicine proper are legion. A spirit of disputation seems to have usurped the place of calm and patient investigation; and may not the cause of this be found in the fact, that the kind of evidence peculiar to this science is exceedingly difficult to estimate, and logical science forms no portion of the medical education. It seems indeed to have been forgotten, or overlooked in educating for the medical profession, that "intellectual cultivation and knowledge are not the same" and "stand in no necessary proportion to each other." *(Hamilton's Metaphysics, vol.* 1, *page* 8.) It is my humble opinion that the cause to which at least some of the confusion in medicine is due is defective professional education, and my belief that if a more perfect system of mental culture were substituted for the present system of simply communicating facts to the future medical man, many of the present useless discussions would give place to unanimity of opinion, and an earnest spirit of enquiry would take the place of the too common error of rash assumption. Having stated what I believe to be causes retarding the advancement of medical science, I shall briefly examine the more prominent points in a set of hypotheses invented to account for Cholera Epidemics, and leave the reader to form

an opinion for himself concerning the justness of my strictures in the particular instances examined.

It will be necessary to commence by adopting some standard or rules with which to compare the hypothesis to be considered ; Sir W. Hamilton *(Lectures on Metaphysics vol.* 1, *page* 171*)* says, "The necessity for some hypothesis "being conceded, how are we to discriminate between a "good and a bad, a probable and improbable, hypothesis ? "The comparative excellence of an hypothesis requires in "the first place that it involves nothing contradictory, "either internally or externally ; that is, either between "the parts of which it is composed, or between these and "any established truths. In the second place an hypothe- "sis is probable in proportion as the phenomena in question "can be by it more completely explained. In the third "place an hypothesis is probable as it is independent of "subsidiary hypotheses." Guided by these three rules, I will examine the three principal classes of hypotheses invented to assign a cause to cholera ; the classes to which I allude may, according to the nature of the cause they assign, be named respectively the Electrical, Poison, and Miasmatic classes of hypotheses, and I shall deal with them in the order in which they are here enumerated.

I greatly regret that I have not been able to obtain such extensive information as I could wish, and I do not therefore present this as an exhaustive examination, but rather as a cursory sketch, in which a few of the most important points of the subject are dealt with.

The Electrical hypotheses may be divided into two classes, the direct and the indirect ; the former class ascribing the effect (cholera) to the direct action of electricity on the organism ; the latter to an indirect action, as, the effect of a change in the chemical properties of the atmosphere caused by electricity. In addition to these distinct classes, there are innumerable observations and surmises put forward by different persons as showing a dependence of epidemics on electrical disturbances, but without any pretensions to ascribing a mode of action direct or indirect. To examine every hypothesis advanced is far from being my wish, even if I were equal to such a task ; I shall therefore take a few instances as characteristic of the whole.

In a book entitled "Electricity, its Nature, Operation and Importance in the Phenomena of the Universe," by William

Leithead, Secretary to the London Electrical Society, the author, after explaining the elementary phenomena of electrical science in the first part of the work, makes an attempt to prove nervous energy is the direct action of electricity, and the nerves are simply electrical conductors; and to erect upon this basis a vast superstructure of assumption.

In a review of this work in the "Annals of Electricity," vol. ii., page 76, it is justly pointed out by the reviewer that the author has mistaken "*acknowledged assertions*" for "*acknowledged facts*," and that "some excellent reasoning "is founded upon no other basis than the latter class of "data." The author explains a depression felt on gloomy days, by the electroscope invariably indicating on such days a negatively electrified state of the atmosphere; this the reviewer (a man of the most extended experience) points out is an *assertion*, as the electroscope indicates no such thing. Mr. Leithead,—after stating that electricity is invariably set free during chemical action, and that consequently it must be set free during the varied chemical action always in progress in the human body,—comes to the conclusion that this electricity must be conducted quietly from the body by some path, and that it aids in the development of heat "by its being transmitted "from the nerves, the most perfect conductors in the body, to "other parts of the frame, and finally to the surface through "less perfect conductors." Admitting the fact of the development of electricity within the body, it by no means follows that any must be conducted quietly from the body, it is probably almost entirely neutralized in the body, being in the form of currents. And far from the nerves being the best conductors in the body, I find on reference they are worse conductors than the muscles in which they are imbedded, and hence if the electricity did escape from them, it would absorb instead of developing heat as stated. De la Rive (*Traite de l' Electricité, t.* iii. *page* 41) says, "Sous le rapport de la conductibilité la substance nerveuse est très inferieure au tissu musculaire." Why should not the chemical action produce the heat directly without the intervention of electricity?

Again, because the spinal column is divided into two distinct cords, therefore says Mr. Leithead, "it is highly "probable that there is an ascending current along one "portion of the cord to the brain, affecting the organs

"of sensation, and a descending current through the "other half, influencing the organs of motion; or, perhaps, "there is a negative and positive portion of the cord, the for- "mer constituting the agent of sensation, the latter that of "motion." Because there are two cords, and two kinds of electricity, does it follow the cords convey electricity? No experiment has as yet shown the existence of such electricity. The columns of the cord are not insulated from each other for electricity; and it has been satisfactorily demonstrated that the nervous and muscular currents move between the transverse and longitudinal sections of the nerve or muscle. Mr. Leithead, with reference to a cholera epidemic, says, "During the whole of the period of the prevalence of "the malignant cholera at Liverpool in the fall of the year "1832, a certain magnetic needle indicated a constant nega- "tive state of the air." To this the reviewer above mentioned replies, that having seen the instrument referred to, he is "perfectly convinced that neither the motions nor posi- "tions of its needle are indicative of the electrical state of "the atmosphere," and there cannot be a doubt as to the reviewer being correct.

From the above alone it will be at once apparent that Mr. Leithead's hypothesis is valueless, being contradictory internally and externally and dependent upon equally inadmissible subsidiary hypotheses.

Mr. Weekes, a surgeon and an eminent experimentalist in Electrical science, has given tables of the electrical state of the air, the state of the weather, and the diseases prevalent at the time of the observations; but, although he draws conclusions from these tables, I cannot find by examination of them any grounds for his conclusions. To take an instance:—a table published in the Annals of Electricity, page 119, volume viii., gives Mr. Weekes' observations for August 1841, and is a register of sixty-three observations. The electrical state of the atmosphere registered is, in thirty-seven of these instances, positive, in twenty neutral, in five negative, and in one variable. On the second occurs two entries, one positive, the other neutral; opposite the neutral entry occurs the following:—"Many cases of catarrh, and some with "symptoms of influenza. Pertussis continues prevalent." On the third occurs three entries, two neutral, and one positive; opposite one of the neutral entries is entered, "Sensation of extreme languor and oppression very general.

"Odontalgic affections are rather prevalent." On the eleventh occurs three entries, two neutral and one positive; opposite one of the neutral is entered, "Obstinate diarrhœa is some-"what prevalent." On the twenty-seventh occur two entries, one positive, and one neutral; opposite the neutral is entered, "General sensation of sultry oppressive heat, extreme lassi-"tude, headache, and slight nausea. No trace of free "electricity can be detected." These are all the entries in this month's register relating to the prevalence of disease. The weather at the times of the registration of the neutral electrical state of the atmosphere was in ten instances rainy, in nine cloudy, and in one clear. The thermometer varied between 58° and 75°, and the barometer between 29·12 and 29·82. Mr. Weekes comments on this month's register as follows: "The general state of the atmosphere during the month of "August would appear to have exercised a highly salubri-"ous influence over the animal system; whence has resulted "a freedom from disease beyond the average standard, not "only in this district, but throughout the eastern parts of "England. The only remarkable departure from the above "condition in my immediate vicinity was incident to about "ten days after the 14th instant, when I noticed the fre-"quent recurrence of somewhat obstinate aphthous affections "with swelling of the parotid and submaxillary glands in "young persons, especially in females."

I am far from asserting that this register kept by Mr. Weekes is a useless record. If many such records were kept for different places, and extending over a considerable period of time; if the particulars upon which the assertions of the prevalence of certain diseases is based were given; and if the most improved instruments and formulæ were made use of; such registers would be of the greatest use in demonstrating any connection which may exist between atmospheric conditions and different states of the human organism. But even admitting that in this case every entry made is based upon reliable evidence, and that the diseases mentioned were really prevalent as stated, the register can only become useful when it fulfils the above condition as to time, and is compared with similar records kept for other places, for people with different habits and constitutions, inhabiting countries with different physical features, and, in short, under conditions as varied as attainable. For without these conditions as to time and place, neither chance, nor other disturbing causes

can be eliminated. If we examine how far these conditions have been fulfilled in the case of Mr. Weekes' register, we shall find they have apparently been overlooked. The first Register published in the Annals of Electricity is dated May 1841, and the portion quoted above is that for August of the same year, and yet the conclusion is boldly drawn, "that the state "of the atmosphere" "would appear to have exercised a high-"ly salubrious influence over the animal system," and this is drawn in the face of the registered statements as to prevalence of certain diseases, which are rather numerous, considering the register is only for one month. But during the month of August, according to the register, the weather was most variable, the barometer and thermometer varied irregularly, and there appears to have been rainy, cloudy, and fine days with great irregularity—in fact, every element considered appears as varied as could be well imagined, and yet the above conclusion is drawn. Again, to say certain diseases are prevalent, is a statement which to be useful scientifically, requires that the information, upon which the assertion is made, accompany the assertion; but even admitting them to have been prevalent, they do not appear to have invariably been attendant on any particular state of the atmosphere, far less an electrical state. It is true the atmospheric electricity was neutral when these diseases were prevalent; but it was neutral twenty times, whereas diseases are only entered as prevalent upon three of these occasions. But in addition to this, during these three days, the electricity was not continuously neutral, but, as stated above, sometimes positive; the barometer and the wind varied; the thermometer is alike (66° F.) in each case in which diseases are mentioned as prevalent; but as there are only three such entries, this fact of agreement is worthless. On examining the entries for "ten days after the fourteenth," I find the same apparent irregularity in all the elements of the weather, and can find no reason whatever from which to conclude that the diseases said to have been prevalent on these days owed their origin to atmospheric conditions.

Mr. Weekes is a man to whom science is undoubtedly indebted and the idea of a register similar to that under examination is an excellent one, but, as I have shown, the conclusions are rashly drawn. Certain conditions remain unfulfilled, and although such observations under those conditions are of the highest importance, and indeed a necessity, unless those con-

ditions be fulfilled they are valueless. It is not therefore because I undervalue the labours of Mr. Weekes that I have chosen his register for criticism, but it is rather because his experience both as an electrician and a surgeon render him a prominent exponent, and in fact authority, on such hypotheses as those under consideration. He may be considered to have a full knowledge of both medicine and electricity, and hence to have made the most of the case. On reference to later authorities, I find no mention of any established fact with reference to the direct influence of atmospheric electricity on particular diseases, nor its influence on epidemics. On reference to De la Rive (*Traite de l'Electricité*, Paris 1858,) I find the following:—

" L'Electricité atmospherique n' agit pas sur l'homme " uniquement par la foudre ; il suffit simplement que le " temps soit orageux et l'atmosphere chargée d' electricité " pour qu' il en résulte un effet sur l'organisme, les individus " sain et bien portants ressentent un malaise, une agitation, " une pesanteur difficile à exprimer ; leur système musculaire " est plus paresseux ; les individus atteints de rheumatisme " sentent se renouveler leurs dolours ; les névralgies augmen- " tent d'intensité ou leurs accès reparaissent. En général, les " malades atteints d'une affection chronique ou aiguë éprou- " vent a l'instant d'un orage une aggravation des principaux " accidents, ils sont plus fatiquès, plus agités, et leur état " fébrile augmente. It est bien probable que ces différents " effects tiennent à l'ecoulement d'electricite qui se fait à " travers le corps pendent les temps orageux, écoulement qui " ayant lieu à travers tous le corps á travers les nerfs aussi " bien qu' á travers les muscles, trouble l'equilibre qui existe " dans l'etat normal et par consèquent doit activer ou contra- " rier certaines functions dependent de l'influence nerveuse."

This is the only reference to the production of an abnormal state of the system by the direct action of atmospheric electricity other than that produced by lightning; and considering the exhaustive character of the electro-physiological portion of this work, and the length of the list of works on the subject given at the end of the chapter in which the above extract occurs, this extract should be a just statement of the extent of our knowledge of the subject. But admitting the statements made to be true, the explanation is very inadequate, being confined entirely to assigning an electrical cause to the effects ; but

a storm is not merely an electrical disturbance, and I submit it is far more reasonable, admitting the effects, to consider them if due to atmospheric disturbances rather due to the sum of the altered conditions than to any one of them in preference to another. And knowing the part played by the skin in giving off moisture, &c., and the diminution which must take place as the air becomes nearer saturation, altered in temperature, &c., it is evident, that apart from the electrical disturbance, the effect might be predicated from the attendant circumstances totally independent of such electrical disturbances. And this renders it certain (so far as the present extent of our knowledge permits of certainty,) that in most of the cases at least, electricity plays a very subordinate part indeed, if it act at all, in producing the disturbance assigned to it. But the facts themselves cannot be received or proved in the absence of the particulars upon which they are based; and it seems to have been lost sight of by the author, that a fact of this nature requires a most extensive and protracted series of observations to establish it; that these observations present innumerable difficulties; and the evidence, consisting partly, as it necessarily must, of the statements of unscientific persons, is, unless the observations are taken on a most extended scale, peculiarly liable to error.

It is generally admitted that the state of the weather may produce sensations of oppression, &c.; but as we have not sufficient evidence collected as to the absence of these sensations in fair weather to enable us to eliminate chance, and as the term 'change of weather,' implies generally an alteration in the Hygrometric, Thermometric, Photometric, Barometric, &c. conditions,—all of which may, and most of which are proved to, affect the eliminative processes performed by the skin, lungs, liver and kidneys,—it is far more reasonable to consider each particular case on its own merits, and to explain it upon the theory generally received by physiologists, than to make an assertion of the general prevalence of the effect, and select one from the host of altered conditions and assign that as the cause of the phenomena. Notwithstanding then the high authority from which the above paragraph is extracted, as M. De la Rive has departed from the rule almost universally adhered to by him, and has not given the evidence upon which the above assertion is founded, and as the conclusion drawn is not legitimately drawn from any stated facts, but bears primâ facie evidence of being as loosely inferred, as it is stated to be general

in its application, I submit that the statement is valueless.

I have now pointed out, and I hope satisfactorily, that neither Mr. Leithead, Mr. Weekes, nor M. De la Rive, have established a connection between the electrical state of the air, and the morbid conditions of the human organism. The first wrote a most ingenious theory as proved by acknowledged facts. The second was an accomplished observer who believed he had discovered the sought-for connection, or rather demonstrated its existence. The third, in a most exhaustive work on theoretical and applied electricity, in the compilation of which every other work of importance on the subject appears to have been consulted, gives only a few lines out of three thick volumes to point out the connection, and these few lines are a mere assertion without proof, the generality of which lays it open to suspicion; and the effect to be explained admits of an explanation which we are bound scientifically to accept in preference to that offered, as being to a certain extent substantiated, while that offered is a mere assumption, as far as I can see, unsupported by any evidence whatever.

In Noad's Manual, dated 1866, I can find no mention of abnormal conditions of the body being caused by electrical atmospheric disturbances, other than those constituting thunder storms. Neither Sir W. Snow Harris', Nichol's Physical Cyclopædia, nor any other work I can call to mind, makes mention of such influences; and if such an important fact had been demonstrated, it is exceedingly curious that it should be so omitted. But the truth is that no such fact has been demonstrated, no series of observations sufficiently extensive, having been undertaken to establish such a connection. The exact state of our knowledge of atmospheric electricity, as bearing on this subject, I will briefly examine further afterwards, with some faults common to direct influence hypothesis generally; but I will first examine into the direct hypothesis put forward by Mr. Wilkins in the last Number of this Journal, and dignified by him by the name of a theory.

Although Mr. Wilkins has headed his paper "Thoughts on the Etiology of Cholera," on perusing it I am led to the conclusion Mr. Wilkins considers his hypothesis that one which should be adopted in preference, as being more in accordance with observed phenomena than any other

hypothesis advanced ; and that it is a particularly happy hypothesis, as compared with that of a specific poison which Mr. Wilkins dismisses as unphilosophical. Unfortunately I am not (as mentioned already) in possession of such a collection of papers on the subject as would enable me to deal with it as I would wish. I shall therefore confine myself, as a final instance of direct electrical hypotheses, to an examination of the hypothesis advanced and supported by Mr. Wilkins—an hypothesis which is eminently unphilosophical.

Referring to the three rules given above, I shall show that this hypothesis is contradictory both internally and externally ; that it does not consequently explain the phenomena it is said to explain, (which may mostly be explained more completely by known physiological laws without the aid of any hypothesis whatever); and that it is itself dependent on another and obsolete hypothesis.

It is contradictory internally. At page 323, third para., it is supposed that coagulation of the blood is an effect of loss of electricity, (?) and that the coagulation is proportionate to the electricity lost ; but in the next para. the blood is supposed to have retained its fluidity owing to its having lost a considerable quantity of its electricity ; or opposite effects have the same cause assigned to them.

The hypothesis is also contradictory externally. The action of noxious exhalations in inducing cholera is explained by the supposition that they prevent the blood being charged with electricity, whereas the chemical action, to which these exhalations are due, gives rise to electricity, and would tend to favour electrization, by actually developing an electrical charge ; in fact one of the sources from which the air derives its electricity in the first instance is this " putrefactive decay of organic matters." But Mr. Wilkins states (page 331) his belief that " effluvia of themselves do not give rise to cholera," whereas, if his assumption were correct, that they prevented the blood obtaining its necessary electrical charge, then on his own showing *they should* produce cholera. Mr. Wilkins has supposed that when the air has a negative electrical charge it has lost its electricity. He explains cholera on the hypothesis of " *a negative electric state of the atmosphere*," (p. 321) and in another place (p. 322) uses the terms " rendered minus" as equivalent to " being deprived of its electricity" ; this, if properly interpreted, shows an ignorance of electrical science.

Electrified negatively does not imply loss of electricity, nothing can lose its electricity; positive and negative are relative terms, signifying different electrical conditions, not presence and absence of electricity, and these terms originated with an hypothesis now obsolete, and hence are objectionable, and likely to mislead. As Mr. Wilkins has quoted Mr. W. Leithead's work, and appears to have accepted his conclusions, it is probable he has accepted this obsolete hypothesis, for at the time Mr. Leithead wrote his book, the hypothesis alluded to was generally accepted, and it is within very few years that the hypothesis, considering electricity as a property or condition of matter rather that a subtle ether pervading matter, has been generally accepted; in fact, losing its electricity considered as giving something up is absurd, when considered by the light of the latest electrical hypothesis. Professor William Thomson, in a paper read at the Royal Institution, (I regret I have not an English report of this paper and am hence compelled to quote from a French translation, *Annales de Chemié et de Physique, Fevrier* 1866, *page* 170,) referring to the state of our knowledge of the nature of electricity, said: "Nous savons qu'il n y a pas de matiere calorique; que des movements imperceptibles produisent les dilatations indiquées par le mercure et ecitent en nous la sensation de la chaleur; que le feu n' est pas contenu dans le charbon pas plus que dans cette bouteille de Leyde ou dans cette balance il y a dans chacun de ces objets *un feu potentiel.* Si la force électrique dépend d'une action residant dans la surface et résultant d'une tension intérieure nous pouvous concevoir que l'électricité elle meme doit être comprise, non comme un accident, mais comme une essence de la matiére. Quelle que soit la nature de l'electricité, il parait entiérement sûr que l électricité en mouvement est de la *chaleur*, et qu'un alignement determiné des axes de revolution dans ce mouvement est le magnetism." Faraday's conclusion is "that non-conductors as well as conductors have never yet had an absolute and independent charge of one electricity communicated to them, and that to all appearance such a state of matter is impossible."

The assumption that electricity in the air inspired charges the blood, is contradictory to the law of the free charge of a conductor being confined to the surface of that conductor, the existence of which law may be conclusively proved by innumerable experiments; but those of Faraday and Biot

alone, demonstrate its existence beyond dispute, and conclusively prove, that no electrical charge could be communicated to the blood in the manner indicated. The hypothesis that the coagulation of the blood is due to a loss of electricity is at variance with observed facts. Blood coagulates if enclosed in glass vessels protected from contact with external air or electrical conductors; shaking in a bottle delays coagulation, whereas rest is favorable to it; is there any electrical difference between these conditions? Cold retards, and some salts prevent coagulation; are the electrical conditions different in these cases? That a loss of electricity may occur during coagulation I do not deny; but this cannot explain the coagulation, as, under similar electrical conditions, it may be retarded or prevented, a fact which proves electrical are not essential conditions of coagulation.

The electricity of the blood is believed by Mr. Wilkins "in a great measure to keep up the polarity of muscle," whereas, the polarity of muscle (electrical polarity) is due to the electricity of the muscle itself, and owes its origin to the chemical action taking place in the muscle. Mr. Wilkins states also that the vigour of the animal constitution is due to electricity and nerve force; he quotes six words from a paper by Dr. W. Phillips, from the Philosophical Transactions for 1815, in proof of his assertion, and further states that some physiologists regard nerve force "as probably identical with the electric fluid." Now, with due deference to Mr. Wilkins, his assertions do not prove anything, and physiologists neither believe animal vigour to depend on electricity, nor that electricity and nerve force are identical. When electro-physiological science was in its infancy, men were naturally startled at every new discovery and exaggerated its importance; not a few thought they had discovered an ultimate principle of organic action. Dr. Wilson Phillips in his earlier researches tried to prove that the circulation of the blood and the action of the involuntary muscles are independent of nervous influence; but the conclusion he arrived at was, "Galvanism seems capable of "performing all the functions of the nervous influence in "the animal economy; but obviously it cannot excite the "functions of animal life, unless when acting on parts "endowed with the living principle." (*Noad's Lectures, page* 241.) The experiments performed by Dr. Wilson Phillips are certainly curious and instructive, but his conclusion

as to the identity of electricity and nervous energy, is not received by physiologists, who, on the contrary, suppose nervous energy and electricity to be correlative, but not identical. That they are not identical is conclusively proved by the fact that the conductivity of nervous matter is not more than one-fourth that of muscle *(Matteucci)*; that the tying of a nerve, although its electrical conductivity remain unaltered, destroys its nervous conductivity; that removing a portion of a nerve and supplying an electrical conductor in such a manner as to restore the electrical continuity in the nerve fibre, destroys its conductivity for nervous energy; that the velocity of nervous energy is only about 30 yards per second *(Hemholz)*; whereas that of electricity is given at from 288000 to 1430 miles in the same time; that the fibres are not insulated from each other for electricity, whereas they are for nervous energy; that all attempts to prove the existence of an electrical current in a nerve during the conveyance of motor impulse have failed, although sought for by Matteucci in the very large crural nerve of a horse; a negative result obtained by so eminent an experimentalist and discoverer, with the most delicate instruments, is in itself almost conclusive. Dr. Abernethy, notwithstanding his knowledge and skill as a surgeon, is no authority on this subject, and Carpenter, Huxley, De la Rive, Matteucci, &c. with more materiel, hold an opposite opinion.

Mr. Wilkins states, page 322, that the vigour of the animal constitution is due to electricity in conjunction with nervous force; if Mr. Wilkins will prove this proposition, he will justly gain a high position as a discoverer, for if reference be made, it will be found that physiologists state no such thing, at least in more modern works. I cannot find this in Dr. Carpenter's works, nor do I remember either hearing this principle stated by Huxley or Marshall during the time I attended their courses, or having read it in any work on physiology, I have ever had the pleasure or labour of reading. What I believe to be the opinion of modern physiologists on this point (the grounds for which opinion almost any elementary physiological work will supply) is, that the vigour of the animal constitution depends ultimately on the action of the physical forces upon organized matter; that the physical forces are heat, electricity, chemical action, &c., and not electricity more than the others; and that proximately it is at any given instant the result of the difference between

the cell life and cell death in progress at that time. I am perfectly well aware that most physiologists consider other systems of the animal economy as subservient to the nervous system, but they also consider the nervous system as part of the "animal constitution," owing its vigour to the same causes as those to which the vigour of other portions of the economy owe theirs. It is manifestly absurd to suppose that the animal constitution owes its vigour to the force developed by a part of itself, which force constitutes its energy, and that electricity is more concerned in conjunction with nervous energy in producing this vigour, than chemical action, heat, or other physical force.

Mr. Wilkins, quoting from Mr. Reid, states that air becomes changed from the positive to the negative electrical state by respiration, and that "various respectable authors" assume "the general principle of the absorption of elec-"tricity by the blood in its change from venous to arterial "blood in the lungs."

That the air becomes changed from the positive to the negative electrical state may be admitted, but if it has changed its electrical state, it is no proof electricity has been absorbed. M. Pouillet and others have shown that evaporation from chemical solutions gives rise to electricity independently of vital action; and as the earth and conductors connected with it are generally charged, the change might be explained by the altered charge being communicated by contact or developed by chemical action or evaporation going on in the lungs. As to the respectable authorities, it would have been better had they been named either by Mr. Reid or Mr. Wilkins, as it is the person asked to believe with whom judgment of the respectability of the authority quoted should legitimately rest. I must admit I never found such a principle even enunciated, leave alone admitted, by any respectable authority I have studied, and I have examined several without finding it. But even if admitted by respectable authorities, Mr. Wilkins is certainly expecting too much, in expecting that in quoting some author who quotes (very indefinitely) from others, but without giving the evidence by which the statement made is proved, he will do anything towards strengthening his own case: but Mr. Reid simply states that the respectable authorities alluded to "assume" the fact, even they are not said to prove it or offer evidence in its support. On examining

further, I find Mr. Reid destroys his own authority by reasoning thus, "Nature does nothing in vain; there is no substance in the whole animal economy with which we are acquainted that does not answer some important end, and we cannot for a moment suppose that the most active and momentous principle in nature can thus be commonly taken into the system to remain in it inactive and useless. It may then be strictly inferred that the supply of electricity is necessary to the animal economy, and that the diminution and suppression of it may produce disease or death." The assumption of what is useful, it has been shown again, and again is not admissible into scientific discussions; but without questioning the kind of assumption, admitting that nature does nothing in vain, how far is Mr. Reid justified in assuming that electricity is the "most active and momentous principle in nature?" Why should not chemical or mechanical force be "most active" and "momentous?" But can it be strictly inferred from the fact of electricity performing *some* function, that therefore it is "necessary" and its "diminution or suppression" may produce disease or death? Let it be admitted that it is not taken into the system to remain inactive and useless, then I submit it cannot therefore be inferred that *it is necessary*, but simply that it performs some office which might, so far as the proof goes, be a very subordinate one indeed. That its diminution or suppression may cause disease or death, is directly disproved by the very common experiment that persons may be strongly charged either negatively or positively, so strongly indeed that their hair shall stand out, sparks be taken from them, &c. without injury. I have been frequently so charged myself and noticed no ill effects. But I have before shown that atmospheric electricity does not change the blood, and a moment's consideration will show that Mr. Reid has made use of the single fluid hypothesis, an hypothesis now rejected as not explaining all observed phenomena.

Mr. Wilkins in explaining how man is robbed of his electricity (?) by air, seems to have forgotten that air is a very bad conductor indeed, and would not take away the electricity as he supposes; on the contrary, in accordance with the laws of electrical induction, if the air were negative, the man would, as forming a portion of the earth's surface, be rendered positive by induction, and not negative as Mr. Wilkins

states. I would here again point out that deprived of electricity and rendered minus (negative) are not the same thing in other words, unless an obsolete hypothesis be adopted which would destroy all Mr. Wilkins' reasoning at once. Far from what Mr. Wilkins states being true in this respect, man is almost always in an electrically neutral atmosphere, for, from three to five feet from the earth, the air is neutral, and in close cities this neutral stratum must extend much higher; hence, if Mr. Wilkins' hypothetical cause is assumed to be the true cause, it will be necessary for him to point out why almost the whole race has not succumbed to Cholera, and why it is not always present in the neutral atmosphere of narrow streets, courts, &c.

Admitting Mr. Wilkins' hypothesis, then cholera should be rife when the air is damp and fitted for carrying off free electricity from the body, instead of so frequently committing its worst ravages for months together during the dry season, as it frequently does, and as is stated by Mr. Day as the result of observation at Kurnool. But a fact which disproves the truth of Mr. Wilkins' hypothesis is that Cholera very frequently disappears on the approach of wet weather, a time which, according to this hypothesis, should increase its destructive powers by increasing the conducting power of the air. That it may appear in an unusually dry season I have myself witnessed in some cases which occurred at Balasore, at the latter end of the last drought, to which is due the failure of the crops, and the present famine.

Mr. Wilkins has assumed coagulation of blood is proprotional to the quantity of electricity lost. I have pointed out above that coagulation does not depend upon loss of electricity, but is affected by various agents and conditions independently of any free electrical change it might possess.

In assuming an altered polarity in muscle, Mr. Wilkins should have quoted some experiment in favour of his opinion, as it is opposed to experience, for in no case has the polarity of muscle been found reversed, and observers agree in stating that the polarity of muscle is invariable.

Mr. Wilkins has likened death caused by Cholera to the effect of lightning, but in the vast majority of cases of the latter the blood does not coagulate, nor does any cadaveric rigidity set in after death, these occurring only (according to M. De la Rive) when death is a secondary result of the shock,

as injury to a vital organ; but the reverse is the case in Cholera, the blood being almost universally found in clots, and the cadaveric rigidity setting in, I believe invariably. Coagulation does not occur in asphyxia caused by breathing noxious gases, is this a result of loss of electricity; if so, how is it lost? Mr. Wilkins states that during a negative or neutral electrical state of the air "dead organic matters putrify rapidly." This I do not believe, I never remember seeing such a statement made as proved in any work on the subject, nor can I find it on reference to the best authorities, De la Rive, Noad, &c., and it appears exceedingly improbable; but, if admitted that dead organic matter putrifies rapidly under these circumstances, I cannot see any connection between this and Mr. Wilkins' hypothesis, for I have before mentioned that man is very generally in a neutral atmosphere. Mr. Wilkins commences to support his hypothesis by stating (as I have shown Mr. Leithead did) that his "explanation will, as far as possible, embrace acknowledged facts." I will point out the contradiction. Mr. Wilkins states Cholera travels westward; and explains this by stating the magnetic equator moves westward; admitting (for argument) that epidemics do travel westward, the explanation is absurd, for the magnetic equator, being a line on the earth's surface, moves with the earth from west to east, not from east to west, as stated by Mr. Wilkins. Mr. Wilkins states the disease sets in "as a rule, after midnight, about two o'clock or thereabouts," and explains this by the "great diminution in the electrical tension of the air which takes place at this time," and he gives, as proof, that by the electrical readings taken at the Kew Observatory during upwards of three years, it was ascertained that in summer the principal minimum took place at 2 A. M. and in winter at 4 A. M., and although he doubts if electrical observations are made in India, he says "but the probability is that the minima, considering the circumstances under which they occur, take place here also at the same time." That there is a greater liability to epidemic disease during the night than during the day is strictly in accordance with known physiological laws, and is a consequence principally of the diminished activity of the system due to diminished respiration. The attacks do not take place at two in the morning but during the whole night. The General Board of Health, referring to the experience of Cholera in England, (*Combe's Physiology*, page 171,) says, "It appears that the great majority of seiz-

ures were between twelve at midnight and six in the morning." In Hamburg the attacks were so generally in the night that when the epidemic was at its height, many persons were afraid to go to bed at all. Dr. Laidlaw's experience of the plague at Alexandria in 1835, was that eight-tenths of those attacked were seized in the night, and he says, "I do not recollect to have been called to a fresh case of plague till between five and six in the morning." But supposing Cholera to commence generally about 2 A. M., Mr. Wilkins' explanation is inadequate, for the laws of diurnal electrical atmospheric maxima and minima have scarcely been established for Europe, and may be true of the temperate zones; but that they occur at the same times in the torrid or frigid as in the temperate zones is improbable, and there is no evidence to judge from; for in places in Europe, where extensive observations have been made, the times of occurrence of these maxima and minima differ, and it is only proved they exist, and the time of their occurrence varies with the season. Mr. Wilkins appears to have misinterpreted the Kew observations, for it is not true that during the three years the principal minimum occurred exactly at 2 o'clock, the fact being that the mean of the observations during three years gave this time; on referring to the plates of the variation of atmospheric electrical tension during four days, viz., from April 27th to May 30th, 1861, as registered by the registering instrument in use at Kew, (*Annales de Chemie et de Physique, Fevrier*, 1866,) Mr. Wilkins will find the minimum referred to occurred at about 5 A.M., 11-40 P.M., 1-30 & 3-50 A.M., respectively, and it must be remembered the specimen register quoted is not selected for any peculiarity it possesses over the register for other periods.

Mr. Wilkins considers his hypothesis receives material support from the fact, that a certain state of the weather precedes and even continues during the prevalence of Cholera. "This state is characterized by an overcast sky, haziness of the atmosphere, probably from extreme humidity." But if Mr. Wilkins will examine further, he will find that although every effort has been made to connect cholera epidemics with a peculiar state of the weather, no such connection has been made out; Mr. Leithead's statement has been already shown to be worthless; Prout found the specific gravity of the air greater than usual during an epidemic, and Glaisher's blue mist is still fresh in the memory of the

scientific world ; but these have not demonstrated nor even supplied evidence towards the demonstration of any such connection. Cholera frequently appears in the driest and clearest seasons in India, and disappears with the rains, and India and Egypt having the driest seasons and the clearest skies, are the countries oftenest and most severely attacked by cholera, furnishing evidence against, rather than for, the direct electrical hypotheses.

Mr. Wilkins quotes from *The Lancet* a table of atmospheric electrical states during the prevalence of an epidemic ; but without further particulars this table is worthless, and with full particulars it is requisite to compare it with similar indications during the absence and prevalence of similar epidemics, and the absence of such data for comparison would alone render the observation useless, even if the state of the air be admitted to have been correctly observed. With reference to Dr. Pickford's remarks, quoted by Mr. Wilkins, I admit that the prevalence of epidemic disease has been associated with the absence or deficiency of positive electricity in the atmosphere, but I deny that evidence has been produced to warrant the association, and, as I have stated above, cholera occurs frequently during dry and serene weather (during which a positive atmospheric charge of electricity is almost invariably present and of greater tension than during damp or cloudy weather) and disappears with the appearance of rain. Upon what evidence has Dr. Pickford established the law that the mortality is inversely as the amount of positive electricity with which the air is charged ? Electrical observations during cholera epidemics have not been numerous and extended enough to prove such a law, even if it existed.

Mr. Wilkins states "that Medical men might consider as "conclusive against an electrical cause of Cholera the fact "that, during the prevalence of cholera, magnets have nei- "ther lost their power or exhibited a disturbance, tending "to the belief there was no electrical disturbance of the air "at the time ;" but this is of no importance, as the magnetic needle neither indicates the presence nor measures the intensity of atmospheric electricity.

According to Mr. Wilkins' hypothesis, atmospheric electrical disturbances produce Cholera, but this is against experience, for these disturbances occur at every season of the year, more or less, in every part of the globe, and Cholera does not

result; and in epidemics lasting for six months at the same place, it is absurd to suppose that so variable an element in the weather as the free electrical charge of the atmosphere should remain fixed.

Mr. Wilkins ascribes the action of metallic salts, oils and sulphur, in curing cholera, to development of electricity and reduced conductivity, but he does not prove they exert any curative effect whatever, nor has any one else proved this, it being generally admitted that a successful treatment has yet to be discovered.

Mr. Wilkins supposes that noxious exhalations are not the cause of Cholera, but predispose to it by either, "altering in a measure the composition of the blood," or by diminishing the quantity of oxygen and electricity inspired. That putrescent particles alter the blood, and that noxious gases lower the heat and act as poisons, is generally admitted. But Mr. Wilkins' explanation is absurd, for the electrical properties of the air are, so far as at present known, little if at all altered by the admixture of these exhalations, and the diminution in the proportion of oxygen in the inspired air is infinitesimal and not sufficient to explain the effect; for taking the oxygen at 21 per cent., three or four per cent. of carbonic acid formed at the expense of this percentage would be fatal. The diminution of oxygen without the presence of the carbonic acid would certainly not produce the effect ascribed to it; but the proportion of carbonic acid in the worst locality is very far below this,—sulphuretted hydrogen the most poisonous product of putrefactive decomposition is more poisonous still—and hence cannot act as supposed. If exhalations acted in the manner supposed by Mr. Wilkins, people inhabiting hilly districts would be peculiarly liable to Cholera, as the proportion of oxygen in the air breathed by them is less than that breathed by inhabitants of the unwholesome districts of the plains.

Mr. Wilkins' statement concerning the greater frequency of Cholera in towns bordering on rivers is not substantiated by him in any way, and it would require a great number of instances to verify it; for it must be considered that the principal "towns and cities" in the world are "bordering rivers" which, in itself, is probably a sufficient explanation. Evaporation is a great source of atmospheric electricity, and hence, according to Mr. Wilkins' hypothesis, persons living near rivers should not be attacked; and the vapour by increas-

ing the conductivity of the air would render both banks electrically the same, and tend to place the inhabitants of both banks under similar electrical conditions.

There is certainly difference of opinion as to the communicability of Cholera, but the evidence is not summed up in the cases given by Mr. Wilkins, and is decidedly in favour of contagion, although due weight must be allowed to the fact that if those conditions which give rise to the disease in the first instance (whatever they may be), continue to be present, they must reasonably be admitted potent to produce fresh cases without contamination from a case already existant; but it must be remembered that the last Cholera Commission came to the conclusion that it was contagious. The prevention of contagion is the one point in the treatment upon which the medical profession agree, and they are almost unanimous in directing their attention to this, rather than to the cure of those attacked, as holding out more hopes of success.

NOTE.—We have to apologize to our readers for the unsightly appearance of this portion of our Journal. It is due to the fact that during the "imposing" of Mr. Douglas's Article, the matter from Page 94—*a* to 94—*f* was accidentally omitted by the printer, and the omission was not discovered until after the rest of the Journal had been actually

Mr. Wilkins states that the poorer classes are not those most liable to be attacked. But it is certain that it is the poorer classes who violate most frequently the rules of health, and who, by overcrowding and bad sanitary arrangements, render themselves most liable to this disease; and they have suffered most in the late epidemic in London. These facts lay Mr. Wilkins' assertion open to grave doubts. I refer to Carpenter and Combe for proof of the effect of bad sanitary arrangements on epidemics; the latter says the rich are almost exempt.

Mr. Wilkins' hypothesis rests upon another hypothesis, now obsolete—having been rejected as disproved; hence as it violates all the rules laid down above, it is inadmissible. Mr. Wilkins labours to explain facts which require no hypothesis to explain them, being already explained by known

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printed and the type "distributed." Clumsy as appears the above device for supplying the omission, it has been resorted to in preference to the only alternative, viz., reprinting the Journal, which would have occupied considerable time and have further delayed the publication of the present number.

—*Editor M. Q. J.*

laws, of these the action of flannel as a prophylactic, and the comparative immunity of medical attendants (?) are good specimens. Cullen has truly observed, "there are more false "facts current in the world than false hypotheses to explain "them;" *(Hamilton, Lectures on Metaphysics, Vol. I., p. 169)* and Mr. Wilkins should have remembered this when stating the effect of rivers on cholera epidemics, and the greater liability of Europeans than natives to the disease. The latter if admitted is satisfactorily explained by the native being acclimatised, and differently constituted, and, as a rule, more temperate. The facts of the Niger expedition, 1841 and 1842, are sufficient to prove that difference of constitution would account for such a fact. Mr. Wilkins states "it is not known washermen are more liable to cholera than other persons;" but they may be, although it may not be known. I may mention that a washerman, employed by me, and several of his family died of cholera some short time ago, and at the commencement of an outbreak. Mr. Wilkins asks why prescribe remedies early if the disease is due to poison? But whatever the treatment in a disease like cholera, if not treated early, it cannot be treated at all, being so soon fatal, and Mr. Wilkins cannot mean to prove anything from the treatment, for it is admitted that this is unsuccessful, and our *belief* as to what causes the disease is no *proof*.

Our knowledge of atmospheric electricity is not sufficiently advanced to account for epidemics by its direct action, and so far as observation goes, the information we possess is rather against than for any such hypothesis. The greater number who would connect epidemics with the direct action of electricity abstain from pointing out the manner in which it is assumed to act, and none prove that the cause assigned would produce such an effect; nor can any experiment be referred to proving this point. It also seems to have been generally overlooked that the observations we possess are insufficient to establish a fact so difficult to prove, and requiring so vast a collection of observation from which to infer:—that man is, as a rule, especially in a large city surrounded by a neutral atmosphere; that he is really, electrically speaking, a portion of the earth, and as such is, as *a rule*, electrified negatively; that it is not the air but the earth which robs him of any free electricity, the vital actions may develope and send to the surface of his body; that atmospheric electroscopic apparatus very frequent-

ly registers rather the conductivity of the air than its free charge; and finally that in localities where cholera is more frequent and destructive, no electrical observations have been taken, and that the reliable observations which have been taken during the prevalence of cholera, are too few to establish anything, even if they appeared to favour a direct electrical hypothesis.

Of the indirect electrical hypotheses, or those which attribute the epidemics to some change in the air having an electrical origin;—I shall consider one, that one being the only one at present (of all electrical hypotheses, direct and indirect,) which modern physicists regard as rendered worthy of consideration by the evidence adduced in its support. Before I can examine into the merits of this hypothesis, it will be necessary to state it. It is known that ozone is produced by the action of electricity on the air; that it exists in the air more or less at all times; that having stronger affinities than oxygen, it exerts a similar action to cholrine in destroying miasmata; that air containing a large proportion of it is destructive to life; that its principal action is on the respiratory organs; that it will oxydize substances which ordinary oxygen will not oxydize, and hence may and does by altering the general properties of the air, cause the oxidation of matter in the body, which in its absence would not so readily be oxydised, but retained. Observations have shown that upon some occasions during cholera epidemics, there has been a marked deficiency of ozone in the atmosphere, but these have not been sufficiently numerous to settle the question; and the observations necessary to show that a deficiency of ozone invariably leads to epidemics have not been made. In the instance given by M. De la Rive, (*Traite de l' Electricité* T. iii. p. 677) in which the results of observations by Mr. Wolf at Berne and by M. Boeckel at Strasbourg are given, there appears certainly to have been a coincidence between the appearance of cholera, and the absence of ozone, upon that occasion; but M. De la Rive justly remarks, many more observations are necessary to establish a connection. The action of ozone is ascribed to its power of destroying miasmata and there can be no question as to its power in this direction when present in any quantity, but the proportion present in the air must be very small indeed, as one five-hundred-thousandth can be detected by the smell, and the

smallness of the proportion would apparently render some other explanation of its effects necessary. But although it may not itself be sufficient to produce the effect it may by its presence (catalysis) raise the affinities of the oxygen with which it is mixed, and, as it is known that air containing ozone has affinities when air containing no ozone is inactive, it is not unreasonable to infer the possibility of ozone acting as indicated, and that its absence might, by admitting of retention of effete matters by the blood tend to zymotic diseases. But our knowledge of this active agent is very meagre indeed, and consists of the fact of its presence in the atmosphere, a few of its properties, and some modes of producing it; but its composition, its distribution, the laws of its variation, and its effects when diffused in an extremely minute proportion through the atmosphere, are still unknown. And although a deficiency of ozone has been noticed upon one or two occasions during epidemics, these are so few and so little is known of its variation under ordinary circumstances, that it would be very premature indeed to conclude it has really any effect either way; for although it is certain that it is a most powerful disinfectant, it must still be admitted that it exists in extremely minute quantities, except immediately after thunder storms, and that in India where thunder-storms are, generally speaking, far more frequent and violent than in Europe, cholera is more frequently present; and it is certain that those particular districts where thunder-storms are most frequent and violent, even for India, are not exempt from its visitations. In the present limited state of our knowledge of this agent, it would hardly be justifible to found any hypotheses upon its physiological action other than upon that indirect action which it must exert as a disinfectant; but the proportion present in the atmosphere being so extremly small, to assign very extensive action to this proportion except by virtue of its effecting an alteration in the properties of the air itself, would be purely assumption; notwithstanding that it be admitted to have so low a chemical equivalent as oxygen.

I have considered above the two kinds of electrical hypotheses—the direct, and the indirect. Of the direct I have chosen those (with the exception of Mr. Wilkins,) I considered fair representatives of this kind of hypothesis. Mr. Wilkins' certainly contains so many contradictions and mistakes, that these alone have brought it to my notice, and induced

the writing of this paper, but the others had for their propounders men with just claims to be considered well acquainted with electrical phenomena, and their connection with vital action ; but it is necessary to notice that since these hypotheses were advanced, the doctrine of the correlation of physical forces has been generally accepted, and the hypotheses upon which they were raised have given place to a science of pure force.

Of the indirect electrical hypotheses, I have considered that one only to which some weight is generally allowed by physicists, but it must be remembered, the general opinion of those capable of judging, is, that the question has been put but not answered, and that a vast number of observations will be necessary before an answer can be obtained.

Having examined the electrical I will briefly notice some considerations affecting two other hypotheses ; one regarding the exhalations from decaying organic matter and retention of effete matter, the other regarding a specific "constitution," in addition to defective vitality and hygyenic conditions, as necessary to the production of the disease. A glance at the facts already known will prove conclusively that some specific condition or conditions require to be fulfilled in order to determine what particular disease shall result from given violations of sanitary laws. That the presence of the products of putrefactive decomposition in the blood must,beyond a certain limit,produce disease of some form, is deduced from the fact that one great function of the blood would be interfered with, that an alteration in its qualities and consequent deterioration of every organ must result. This deduced inference is verified by hundreds of well-authenticated instances, the most striking of which may be found in any goodManual of Human Physiology That the introduction of poisonous organic matter from without may alter the whole of the blood in the body, and through the blood act upon every organ, is proved beyond all doubt by vaccination, inoculation,by accidental puerperal poisoning, and by numberless experiments on animals undertaken to demonstrate the fact.

Now it being admitted that all conditions which import into the blood, or cause it to retain, decaying organic matter, tend to produce disease and death, it becomes a question what is the cause determining what form the disease shall take. To

this unknown cause has been given the name of the "epidemic constitution." Whatever tends to lower the vitality, to interfere in any way with the excretory functions of the skin, lungs, or kidneys, or to import into the blood the products of putrefactive decomposition from without, renders the system peculiarly liable to be attacked by cholera, typhus fever, &c., according to the epidemic constitution; for it is admitted that places which are at one time hot-beds of typhus, during cholera or other epidemics are equally favorable to the development of the new disease; knowing that in cholera the blood is altered in some of its essential qualities, that such alterations are brought about by contamination produced in other cases, either purposely, as in vaccination, or accidentally as in the puerperal poisoning; knowing that the quantity of poison necessary to produce this alteration is extremely minute, so much so as to be inappreciable, it is certain that the introduction of a poison by the breath might produce such morbid alteration in the blood; if it be considered that the exhalations from the lungs and skin of a person already attacked, are quite competent to reproduce the disease in another person with more certainty, as the blood has been already altered by containing noxious matter, the poison hypothesis supposes at least an adequate cause. If a set of conditions are potent to develope a first case, it is reasonable to suppose, that although the dissemination of morbid matter may really assist the spread of the disease, this original cause may produce other cases independently of the first; and as it is certain the epidemic has a beginning somewhere, and this primary cause must, in the beginning, be independent of the disease itself, such discussions as that between MM. de Pietra Santa, Cazalas and Didiot and M. Grimaud de Caux *(Comptes Rendus, tome* lxiii.*)*; in fact, discussions whether or no it was in any particular instance communicated by persons already diseased, are of secondary importance, for such discussions must leave the cause of the disease untouched. If the disease be attributed to contagion, as it frequently is, this is really begging the question. Even attributing the disease to a poison in the first instance, is to attribute it to what must be a proximate cause, for although it be admitted that poison is the cause in the first instance, what is really required is, to what conditions does the poison owe its origin? That products of putrefactive decomposition are favourable to disease is proved, and that a change into camp,

where the conditions are more favorable to the removal of effete matter from the blood by the lungs and skin brings about as a rule a stoppage of its ravages, would seem to favour the opinion that a poison originates in the body itself, and its retention or presence in the air breathed, are the conditions necessary for determining its action, and this opinion is favored by the fact that the inhabitants of the cleanest jail (if overcrowded) are liable to attack, and that on removal to camp, at even a short distance, the disease disappears; but up to the present all that has been advanced has been hypothesis, and we are totally ignorant of the real cause.

A vast amount of time has been spent in collecting facts, and papers innumerable have been written with a view to clear up the mystery; but to discover the obscure cause of a disease, and the success of a given mode of treatment, it is necessary to compare the disease under all circumstances of varied climate, habits, and constitution, and to collect the facts of a vast number of cases. To do this requires not the experience of one, but of all; not the facts of individual cases, but of these in conjunction with those of other epidemics. To compare case with case is undoubtedly useful and is a first requisite in every examination, as deciding the identity of the phenomena, but this evidently cannot lead us to the cause of the epidemic; to find this it is necessary to compare epidemic with epidemic, the Hygrometric, Barometrical, Electrical, &c. states of the atmosphere, the physical features of the countries, the constitutions, and habits of their peoples, and in fact every condition which might influence the health of those attacked, during, and in the absence of the epidemic; to obtain the fullest information for places peculiarly liable to attack, and for those in which the disease never appears. But how is this information to be obtained? If information of such extent and generality could be obtained, it would prove of the most vital importance to the human race, not alone in the matter of cholera, but in all diseases and all modes of treatment, and in knowledge of natural phenomena other than those appertaining to medicine directly. If the labours of individuals are comparatively useless, considered individually, how are they to be combined in order to become useful? Academies cannot do it, medical schools are distinct bodies frequently antagonistic, rather than working together, and an organization quite out of proportion

to the capabalities of either is required. I reply, by a gigantic international organization which need not confine itself to medicine alone, but which might extend its operations to other sciences, in which extended observation is equally necessary to just conclusions. In the way of the formation of such an organized system of observation there are undoubtedly difficulties, but it must be remembered that it is to the interest of every one to further the object of this formation; that all the educated at least would gladly subscribe for such an object; that Governments would lend their aid; that academies would lend the assistance of their organizations, and that with a judicious division of labour, there would be no lack of labourers. By such means all the at present useless observations of individual observers in all countries might be directed and rendered available. Instruments might be distributed, and many more induced to observe, and the many would bear the expense as they reap the benefits of obtaining correct information. The labour of tabulating, classifying, &c. might either be left to individuals, or done by paid officers of the association, but in any case a few years would give such a mass of information as would certainly tend to clear up many existing doubts; and from its mass and the number of observers concerned, would eliminate the chances of error to which the best observers are liable, and those due to the prejudices of the individual observer. All observations might be rendered more useful from being properly directed, and the instruments being uniform and reliable; in few words, the grandest results to humanity would flow from such an organization.

Associations embracing the natives of different nations have been formed from time to time, and Freemasonry exhibits an instance of an association of this kind formed for purposes very subordinate to that of the proposed. The labour might be divided in a manner somewhat similar to that in which it is divided in Freemasonry, a Central Committee being chosen for each kingdom, with subordinate Committees wherever considered necessary or expedient. And with care in framing the tables to be filled in by observers, the classification of the results of observation might be examined by the Sub-Committees, and the great difficulty of classification and tabulation would be thus disposed of. The Medical profession would furnish a numerous, educated, and willing, set of observers who, to medicine at least, might supply sufficient evidence in

a year or so to set at rest many disputed questions of considerable importance; and it appears curious that such an association as that proposed has not already come into existence.

Medicine requires statistics for its basis, for a large proportion of the phenomena it embraces requires an enormous number of observations in order to ensure accuracy in the conclusions to be drawn. But the collection of these statistics being left to unguided individual observers, the majority keep no record at all, and their experience is lost to their fellows, and it is not an uncommon occurrence to find a laborious series of observations rendered almost useless by an important omission, or the observations of different compilers incomparable by reason of the totally different modes of procedure adopted. It might be urged that individual difference of opinion would form an insurmountable obstacle to any such association as that proposed, but it must be considered the object of the association proposed differs from that of scientific associations generally, in being merely the collection and encouragement of reliable observations and not the *discussion* of the observations tabulated; the latter might safely be left to learned Societies and individuals. There can be no doubt of the existence of willing labourers, and the papers (individually useless) which appear in the Medical and other scientific journals, bear witness to an earnest desire to be useful; but there is confusion in the host, and discipline is required to ensure success. The relation of such an association as that proposed to the present system is that of a disciplined army, to an undisciplined mob; and the useless discussions so frequent at the meetings of the British Association, &c. (where assumption, and such inferences from insufficient data as those of Dr. Lankester on infanticide, supply the place of that which alone deserves the name of knowledge, and which is arrived at only by laborious, strict and numerous observations) are some of the fruits of the want of unanimity, exactitude, order and data it would be the object of such an association to induce, infuse, direct, and collect.

Art. X.—*The Etiology of Cholera.* Letter from Surgeon M. C. Furnell, Medical Officer, Ootacamund.

To the Editor of the Madras Quarterly Journal of Medical Science.

Sir,—In a very able and interesting paper on the "Etiology of Cholera" by Mr. Wilkins, which appeared in the Madras Quarterly Journal of Medical Science for October 1866, and in which, if I rightly understand the author, he contends for a purely electrical cause as the origin of Cholera, as against a contagious poison, occurs the following sentence :—

"It is stated that the two women who visited the town of "Dundee while cholera was prevailing there, were attacked "on their return to Arbroath, as well as the six people who "visited them during their illness. This seems a strong "argument in favour of the prevalent view. *Is it not just "possible that this is an exaggerated account given to a "Medical man who took it for granted, and recorded it as a "fact?*"

Allow me through the pages of your Journal to place upon record the following fact, which it seems to me difficult to explain away on electrical grounds, and which moreover is so recent that Mr. Wilkins can have no difficulty in ascertaining whether it is exaggerated or not. A few carefully recorded facts of the same sort must carry great weight.

In October 1866 the cholera showed itself in Ootacamund, a Sanatarium which has hitherto been singularly free from any epidemic of this complaint. I will relate what occurred by extracts from a letter, *written at the time,* to the Deputy Inspector General :—

"Sir,—"I regret to have to report that cholera made "its appearance in this station on the 11th of this month "(October). It was imported from Coimbatore, that is "to say, the people first affected were all people who had "just returned from visiting Coimbatore* on some religious

* I subsequently learnt the name of the village was Caroomoothan putty, near Coimbatore, and most of the cases were brought in suffering at the time from Cholera.

"festival. Eight cases first shewed themselves ; of these two "died and six did well."

2. "On the 15th October two more cases occurred. "One in the sister of a man who had cholera, and on whom "she had been in *close attendance ; this girl had not been "to the low country.* The other in a woman who had not "been to the low country either, *but had been visiting in "the house of a neighbour where a cholera case had "occurred.*"

Both these last cases proved fatal. Then the Cholera stopped.

Dr. Miller, the late able Medical Officer of these Hills, saw these cases with me, and was most painstaking to discover if in these two last fatal cases the patients had been down to the low country, but it was very evident they had not. He had known in his experience of Ootacamund, extending, I believe, over some three years, cases of Cholera imported before, but had never known it to spread.

Mr. Wilkins may be able to suit these two cases to his electric theory, I confess it seems difficult to me to do so. I feel it my duty however to place the fact such as it is on record.

I am Sir,

Yours faithfully

M. C. FURNELL,

Medl. Officer, Neilgherries.

Art. XI.—*On the use of Margosa leaves in Small-pox.* By S. Pulney Andy, M. D., Superintendent of Vaccination, Travancore.

Among the sacred plants of India the Margosa or Neem *(Azadirachta Indica,* Nat. Or. *Meliaceæ)* is held in veneration by the Hindus as being dedicated to the Goddess Mariatha. This Deity is considered by them to preside over all epidemics, or in fact the epidemics themselves are thought to be a visitation of this Goddess, in honor of whom the Margosa leaves are in common use with the Indians, particularly in cases of Small-pox. The leaves are spread on the bed of, as well as used for fanning the patient, besides a bunch is fixed just above the door as a sign of the presence of the Goddess in the house. However, the medical writings of the Hindus speak of it in a very different light to what is generally believed. The term *Mari* itself is a feminine form of *Maraka,* a Sanskrit word, signifying Death and Epidemic, and it is probable that the ancient Hindus might have deified the destructive tendency of Nature, and classed her amongst their Mythological Deities. Again, the term *Vasuri,* which is nothing but the corruption of an original Sanskrit word, *Masurika,* meaning gram or a disease of gram-like eruptions, is used by the Hindu Nosologists as the generic term for Variola.

According to the writings of Kishi Agastiar, the celebrated sage Physician and Theologian of Southern India, Small-pox is produced as the result of the fermentation of the humours of the body, and he says that the articles generally offered to the Goddess are in themselves a remedy for Small-pox;—thus the use of Margosa leaves is supposed to bring out the eruptions freely, and the others are dietetic agents of a cooling and nourishing nature.

When the remedial properties of *Saracenia Purpurea,* and *Nepenthes Distilatoria* (Mr. Loftus' specific for small-pox) were discussed by the Press, it struck me that the Margosa leaves, which have been in use in India from the time of

antiquity, might also be found to possess some virtue, if trials were made. Unfortunately my itinerating life did not offer me an opportunity of experimenting until April 1866.

In the course of my first circuit to Alwaye, a place greatly resorted to by the natives during the hot months for health, in the northern extremity of Travancore, I came across a few cases of Small-pox left neglected by their friends and thrown out on the plains under the shelter of cadjan sheds. In the absence of the other drugs referred to, I took the opportunity of prescribing the Margosa in the following form :—

Take of

Tender leaves of Margosa (Azadirachta Indica), or Davanam, the leaves with stem of Artemisia Austriaca,

Liquorice root, of each an equal quantity.

Mix and grind up to a mass with a few drops of water, and divide into pills of five grains each.

I ordered a pill to be given three times a day. They were tried in six cases ; all were of confluent form in adults. Two of them were on the 4th, three of them on the 7th and 8th, and the other on the 15th day of the disease. With the exception of the last patient who died of exhaustion the same day that the medicine was administered, all recovered.

When I visited the same locality in November, after a period of six months, there were also eight cases of Small-pox, and their friends, on hearing of my arrival, came and begged of me for the pills I gave during my last visit. With the exception of one case of a malignant type in a man aged 50, who was in a dying state when I took him under treatment, the rest of moderate severity also recovered.

As far as I had an opportunity of testing the drug in these 14 cases, it appeared to be beneficial, when administered during the premonitory and progressive stage of the disease, and to be of little or no use after the eruption had passed the stage of maturation. It seemed to decrease the severity of fever, facilitate in throwing out the eruption freely, and alleviate all other sufferings usually experienced in this disease. In fact, the patient expresses himself as passing through the several stages of the disease with comparative ease, without much pain or uneasiness.

I simply bring forward the facts as they occurred to my observation, and I now leave it to other members of the profession to give a fair trial of the drug, as opportunity offers them. Owing to the nature of my itinerating life, I scarcely find opportunity, or command sufficient time, to watch the effect of the drug or the progress of the disease under its influence, to note down observations and to collect satisfactory statistics on the subject. I shall feel obliged to any one who may undertake the trial on an extensive scale, and publish the results whereby greater light may be thrown as to the real value of the drug in this most loathsome disease, Small-pox.

In places where fresh plants cannot be had, I would suggest the use of the dried tender leaves of Margosa either in the form of infusion or decoction, with the other ingredients in the prportion of a drachm each to a pint of water. The dose for an adult being one ounce of the decoction twice or thrice a day.

PART II.

REVIEWS AND NOTICES OF BOOKS.

Report on a Project for the Drainage of the Town of Madras. By Captain HECTOR TULLOCH, Royal Engineers. Madras, Gantz Brothers, 1865. Crown 8vo. pp. 120.

Second Notice.

CAPTAIN TULLOCH'S fourth chapter is headed "objections to sewers answered." Mr. Cornish's name might very well have preceded the word "objections", for our author says :—

"Fortunately these objections have been very fully stated by the same officer who has pleaded so strongly on behalf of universal dry conservancy."

This chapter occupies thirty pages of the Report, so that it may be concluded that the objections are thoroughly considered. It opens with the following paragraph, which we think incontrovertible, and the second sentence of which we fear might have been written in the past rather than in the future tense and subjunctive mood.

"At the present time when sanitary questions are attracting great attention, it is of vital importance that the general principles of water-supply, drainage, barrack-construction, &c. should be thoroughly discussed. If mistakes are made at the outset in carrying out large and important works, the chances are that they will be repeated over and over again, and at an enormous cost to Government. Whereas, if the correct principles of any one subject are clearly defined, there is every hope of their universal adoption. As this is the first project which has been submitted to the Madras Government for the complete drainage of a large town in the Presidency, it would be a grievous error to carry it out if it should be based on erroneous theories. On this account, therefore, I have considered that I should be discharging my duty to Government better by omitting nothing in this Report bearing on the question of drainage, than by confining myself strictly to the immediate subject matter."

The first objection which Capt. Tulloch notices is that the rivers in Southern India do not flow all the year round, and that therefore there must always be an insufficiency of water for flushing sewers. To which is given the answer :—"If sufficient water is stored in the monsoon and when the rivers *are* flowing, there need be no lack during the hot months." The source of all water, generally speaking, in every country, is the rainfall, and in India, on the average, this is double that of England. And after making due allowances for loss by evaporation, there is an enormous balance of water available for the use of man. The importance and success of store-reservoirs is pointed out; and we opine that could Capt. Tulloch have foreseen, at the time he was writing, the long drought of the past year and the resulting famine, we should have had some words of warning as to the great insufficiency of the present existing tanks for purposes quite independent of any drainage system.

It is quite right that "the quality of mercy" should be called into play to feed the starving poor, but would it not be more politic to do all that human power can effect to avert the chance of the failure of the food crops ?

That Capt. Tulloch is quite right as to the sufficiency of water in Madras, our experience during the late rainy season has entirely proved. The abundant rain produced such an overflow of the Cooum that the town was completely flooded in many parts, and as no sufficiently capacious store reservoirs exist, and the upper part of the river is not dammed—Colonel Miller's dams were never effectual, and no attempt has been made to render them so—the usual course of letting the fresh waters, we so much need, escape into the ocean had to be resorted to, with the usual effect, viz., that the stream rushed sea-wards with such rapidity that the upper waters only escaped leaving the filthy lower stratum and the solid sewage poured therein at the bottom of the river-bed. And now we have our nostrils once more assailed with the disgusting odours emitted from one of the great cloacæ of Madras.

Capt. Tulloch gives a list of the principal towns in the Eastern Districts of this presidency, which is intended to show that an ample water supply is available for them, if proper storage works existed. He omits the towns on the Malabar side, as hardly any one would maintain that there is an insufficiency of water on the Western Coast. And he concludes this section by saying :—

"So far as Madras is concerned, there need be no anxiety about a deficiency of water for flushing purposes. I could only wish that there was not so much available under the surface as there is, because the cost of building the sewers is proportionately increased. The flushing arrangements will be most complete and will cost nothing after the sewers are once built."

The next objection is contained in the question "Where is the sewage to go to?" and in the reply "To the rivers." Mr. Cornish says:—

"The great rivers, the Godavery, the Kistna, and the Cauvery, which contain more or less water throughout the year, do not run near to many populous towns, and are practically unavailable for the purpose. Along the Coast, sewage might probably be pumped into the sea, but the difficulty would still remain with inland towns such as Bangalore and Secunderabad."

And Capt. Tulloch replies:—

"The error in this reasoning lies in supposing that rivers, as outfalls for sewers, are a *necessary* part of the sewer system. They form no part of it at all. It is indeed unfortunate that in so many instances in England sewers should have been led to rivers, but this is not the fault of the sewers but of the people who built them. * * * * All sewage, and especially in this country, should be returned to the soil—to the same place where the solid manure of dry conservancy is to be conveyed. Those who are so anxious to preserve urine and fæces as manure should not forget that, after all, they cannot manage in India without water, which must descend as rain or be raised artificially before crops can be made to grow. The only difference, so far as the agricultural part of the question is concerned, between solid manure and liquid sewage, is that in the first case you have an article which is almost useless by itself, and in the second you have nearly all that is required to produce anything. The mistake lies in reasoning from England to India without considering the different conditions of atmosphere, soil, &c. prevailing in the two countries. In England it is raining more or less throughout the year, and the first question which the agriculturist puts to himself is, "How shall I get rid of the water?" In India it rains for about 20 or 30 days, and the first question the ryot asks is, "From where shall I get water?" The soil in England in its normal state is saturated with moisture, and every effort is made to keep it dry. The soil in India is dry, and every effort is made to keep it moist. Sewage is manure in a diluted state. But its use even in England, *now that they understand how the sewage should be applied, and what crops should be grown under it*, is almost uniformily successful and is advocated by the greatest authorities."

Capt. Tulloch then quotes from Mr. Cornish's pamphlet to the effect that practically the liquid sewage system in Europe has failed as regards its use to the agriculturist, the more valuable portions of the sewage being decomposed and dissipated, leaving but a fetid fluid behind no more fertilizing in its properties than ordinary river water; and he proceeds to show that Mr. Cornish is in error and that the evidence in England now all inclines the other way. He instances the case of Edinburgh where, by the use of sewage, land has risen in yearly rent from £2 to £6 per acre, to from £30 to £40 per acre. At Clitheroe in Lancashire the fertilizing properties of sewage water are four times as great as those of common farm-yard manure. At Mansfield, Nottinghamshire, rent of land has risen from 4*s.* 6*d.* to £14 per acre. At Ashburton, Devonshire, sewage irrigated land produces £8 to £12 rent per acre, whilst ordinary land produces only £1-10 to £2. At Croydon the success has been complete. Other instances are mentioned, and we are told:—

"Every year the use of liquid sewage in England increases, and the *belief in its value is now general.* It is not a perfect manure, but no substance can possibly be a perfect manure. All that should be contended for sewage is, that it has great fertilizing properties."

We lately met with the following extract from the *Sunday Gazette*:—

"*London Sewage.*—The Reclamation Company now actively engaged on the north side of the Thames, has already tested the value of the metropolitan sewage, and contemplates its regular and systematic utilization on a farm which the company is about to purchase. Early in April last a plot of waste-land at Barking Creek, devoid of surface soil, was covered with common sand, brought from Mappling, near Shoeburyness, to the extent of two feet thick, on which was sown grass seed. The surface was then well irrigated with ordinary London sewage from the northern outfall. This has been repeated once or twice. The effects of this manufacture of green meat—for such indeed, it may be most justly considered—has been the production of three crops; one cut in June and July, at the rate of sixteen tons per acre; a second of eight tons; and a third, now growing, and almost ready for the scythe."

It is but right that this matter should be fully considered. Nothing but actual experiment can furnish data for argument; no chemical theories as to the decomposition of phosphates and other salts and evolution of ammonia can possibly

avail in judging of sewage utility. Upon this subject we would refer our readers to an article entitled *Sewage and Sewerage* in the number of the *Quarterly Journal of Science* for April 1866.

We have four distinct plans of removal of sewage matters advocated in this country. The Punjaub or dry system; the dry earth system; the half dry, half wet system now carried on in Madras, with manure carts and open drains; and the sewer system. The able writer in the *Quarterly Journal of Science* says:—

"Of the various plans for removal of sewage, the simplest is that which merely takes it away without the addition to it of any water or the admixture with it of any disinfectant or deodorant substance. It has or might have its place and application in regions where from extreme drought or extreme cold, water is not available for the same purpose and labour is cheap. In a populous town and a civilized country the water-tight carts which would be necessary for carrying out such a system would be so numerous as to block up the streets, and whilst thus rivalling all other modifications of the dry-method in cumberousness and expense, it exceeds them all considerably in offensiveness. * * * *

"On the other hand, it is right to say that Sir Joseph Paxton, though, as a horticultural physiologist, he was fully aware that 'plants could not take up solid manure in its crude form, the spongioles becoming ulcerated by contact with it, and that therefore an application in a diluted form was the application by which plants were best supplied,' did, in his evidence given before Dr. Brady's Committee, hint that mechanical science might one day make a removal in this way very possible 'without our ever knowing anything about it or having the slightest possible smell in the house.' 'In the diluted form,' he proceeds to say, 'it is very valuable, but in the solid form it would be commercially much more valuable.' * * The Japanese and Chinese are ordinarily taken as illustrations of the success which may attend the adoption of this plan; and we are far from thinking that we may not learn many valuable lessons from nations whose vast experience and urgent necessities must have forced upon them so many lessons of ingenuity and economy . . . but in this matter of the utilizing of sewage, we are inclined to think that the difference of our social conditions renders their example inapplicable to us. It is their habit to dilute their manure very largely even though not so largely as the forty gallons of water per head of London extravagance, before they apply it to the land.

"The poudrette of the Patent Eureka Company, on the other hand, is sown broadcast over the land in a dry form, a plan which

we think contrasts to disadvantage with these oriental methods, and which must ultimately impair somewhat the success which, we learn, has been considerable in the town of Hyde. Even the Chinese 'have the idea that manure, whether the production of bipeds or quadrupeds, if applied to land in a dry state, burns the plant." '

But to return to Captain Tulloch. That he has taken into consideration some of the points considered in the foregoing extract is shown by the remarks which immediately succeed his proofs that liquid sewage is usefully applied to agricultural purposes in England.

"If all this can be declared of England, where already there is too much moisture in the soil, what wonderful fertility might be produced with sewage in India? Pour water on the land—flood it if you like—and what is the result? A succession of crops. Would not better crops be secured with water mixed with manure? It may be granted that solid manure, bulk for bulk, is more valuable than sewage. But that is not the point at issue. The point is, whether solid manure in a dry country like India with 20 or 30 wet days in the year (Dr. Cornish says 12 days only, which is all the better for my argument) is worth 20 or 100 times its bulk of sewage, which, according as 5 or 20 gallons of water are used per head of the population, I have already shown, it will amount to. And even this is not putting the case fairly, because every pound of solid manure will have to be carried to the fields, and then spread and mixed with the soil by manual labour, whereas liquid sewage can be applied to the land by simply opening a sluice. Thus drainage works in India should be looked upon as works of artificial irrigation—that they will ultimately become so, I have no doubt whatever. The land will make its claim good to every drop of water and every ounce of manure, in spite of all that may be done to prevent it. It will, in the proper place, be shown in how remarkably favourable a position Madras is situated for the utilization of its sewage."

Capt. Tulloch omits to enforce his argument by saying here, although he has previously noticed the fact, that even when solid manure has been applied to the arid soil of India, it will simply be destructive until its dilution with water has been effected. Our author is quite right when he says "the mistake lies in reasoning from England to India without considering the different conditions of atmosphere, soil, &c. prevailing in the two countries."

By and by we shall show that, in giving the details of his project, Capt. Tulloch most materially weakens the argument of the above extract, by proposing to exclude

excrementitious matters altogether from the sewage he proposes to utilize.

Capt. Tulloch answers the question "Where is the sewage of inland towns to flow to?" by saying in effect;—"Utilize it,—return it to the soil."

The next objection is, that costly drainage works will never keep the town clean of ordure, for the simple reason that natives will not sit upon or use water-closets. And Captain Tulloch asks:—

"Are we then to suppose that sewers were introduced to suit water-closets? Until now it has always been believed that water-closets were introduced to suit sewers. But why will not natives use water-closets? and how has this been ascertained in Madras? Perhaps they object to sit on them in the same manner as Europeans. Nothing would be easier than to design water-closets to admit of natives sitting with their feet on the seats. . . . . .

"Whatever may be said to the contrary, that system of conservancy is the best which, provided it is not injurious to health, can dispense with the employment of men and women on duties which no human being should be called upon to perform. Water-closets require no toties, and 40 men could easily look after all the sewers of Madras. But dry conservancy in Madras would require that 4,000 of the inhabitants should be engaged in one of the most disgusting of occupations. The use of water-closets, however, is altogether beside the question of drainage. Whether the excrement is removed by means of them or is carried away in carts, the sewers will still have quite sufficient work to do."

We shall have something to say about water closets further on.

The next objection to sewers is that the materials of which they are composed are absorbent, that the watery parts of the sewage are taken up by the soil and the solid refuse left to choke the channels. And Capt Tulloch replies:—All very true as regards Madras, but nevertheless the English model of sewage has never been attempted here. "In the project now submitted, I have provided that steam-pressed bricks only shall be used, and that they shall be set in hydraulic cement, and that the sewers shall be lined *throughout* with a coating of asphalte. The subject of materials is so entirely a professional one, that I will not pursue it further in this place." And he proceeds to show the utter dissimilarity between the Madras open and unsloped drains, and a scientifically-built system of sewers.

The next objection to sewers is that they create a great nuisance.

"This nuisance is an objection to all systems of conservancy. Where foul matter is disposed of, there must be more or less smell. Latrines on the dry conservancy principle are not inodorous but merely less offensive than those in which water is used. Sewers remove *all* liquid refuse with a little nuisance. Dry conservancy, so far as it goes, removes some of the refuse with, say, less nuisance,—but unfortunately it does not go very far, for it leaves at least nineteen-twentieths of the refuse behind."

Then it is to be remembered that sewers can be rendered innocuous by disinfection; and Capt. Tulloch, says "for Madras, I have arranged that the sewers shall be throughout ventilated through charcoal disinfectors, a plan which is found to answer admirably in Europe." Capt. Tulloch next points out that the objections that have been urged against the sewerage system of Bombay and Calcutta do not refer to the sewers but simply to the place of outfall, that of Bombay being "the harbour for the benefit of the shipping," and that of Calcutta a great salt marsh.

And lastly he observes that both Dr. Thudichum and the Rev. H. Moule have repudiated the idea that they proposed to interfere with the proper working of the sewers; and he concludes:—

"If a thousand model latrines were to be built in Madras immediately, the state of the streets would not be in any way affected by them. Some of the most disgusting and filthy neighbourhoods in Madras are well furnished with privies. The drains would be as offensive as they now are, and the people would be burdened with the cost of an experimental system of conservancy which, by absorbing all their funds, would effectually put a stop to all works of real improvement."

We now proceed to the *Description of the Project*, and Capt. Tulloch furnishes us with the following outline of it.

"It is proposed to drain Madras from the south to the north—to separate the sewage from the rain-water—to carry the former by sewers of small capacity to *one* central spot, north of, but near, the Madras Railway, and in the neighbourhood of the village of Coorookoopett—to lift it there by steam pumps—and, according as Government may decide, either to discharge it by an outfall sewer into the sea at a point two miles north of the Railway, or to utilize it on some thousands of acres of waste land lying to the north-west of Madras."

Capt. Tulloch defers the consideration of the utilization of the sewage and first enters upon the question of where shall the outfall be? He very wisely dismisses the rivers and canals, for the simple reason that to drain Madras into them is merely to convert them into,—or rather to leave them as they are at present,—gigantic cess-pools. The sea then is the only outfall, but no sewage should be discharged near the town. Capt. Tulloch, like ourselves, lived long enough in Fort St. George to be able to say of the great sewer at the north east angle of the Fort which drains only a portion of Black Town —"No description can convey to the minds of those who have never lived within the influence of the smell from this sewer, its overpowering offensiveness when the outlet is open." It certainly is not pleasant to be awoke in the middle of the night by a frightful sense of suffocation, and a feeling as if there were something unpleasantly thick in the air, and then to have your olfactories assailed with a sickening stench, only to be got rid of by closing doors and windows, setting the punkah vigorously in action, and freely sprinkling the room with Condy's, or Norton's, or McDougall's fluid, with an after dash of Rimmel's Toilet vinegar. And it is equally unpleasant to have a little social gathering terminated by one's guests suddenly calling for eau-de-cologne, plunging their noses into their handkerchiefs and hastily ordering their carriages in order to drive away out of the range of the "dreadful smell." It is fortunate for the residents of the Fort that the "unfavourable winds" only blow for a few weeks in the year. Those who have suffered from this outfall sewer can sincerely pity their poor fellow-subjects who are compelled by circumstances to reside in such places as Anderson's Street and Stringer's Street in Black Town where the atmosphere inhaled is constantly impregnated with the same kind of effluvia only in a less concentrated form, and such persons can heartily enter into the spirit of any scheme which proposes to effectually abolish the nuisance.

Fully establishing the principle that no out-fall sewer should be permitted near the town, Capt. Tulloch next enquires: "Shall the sewage be carried into the sea north, or south, of Madras?" In order to answer which the following points have to be considered:—

1. The physical features of the town. These are shown o be such that, although there is no natural line of drainage or Madras, considered as a whole, yet certain local circum-

stances establish the fact that the only course is to drain to the north.

2. The direction of the prevailing winds. The most frequently prevailing winds would carry the smell in either case out to sea. Those which would bring it into Madras, either from a northern or a southern outfall, blow each for about 80 days in the year, so that this can form no guide.

3. The sea currents. These are decidedly in favour of a northern outfall.

4. There are special advantages offered by a northern outfall. No engineering difficulties and therefore comparatively little expense. No opportunities for utilizing the sewage in the south, whilst in the north, there are upwards of 20,000 acres of waste ground situated on the most favourable level possible, and in the directions from which the wind blows least often during the year.

How far north should the sewage be discharged? For the present Captain Tulloch has arranged to discharge it at a point two miles north of the Railway station. But ultimately it may be carried to a point three, or even four miles to the north, the question being one of expense only, as no engineering difficulties exist.

The next question is, will any lifting apparatus be required, or can Madras be drained by simple gravitation? The levels are such that in order to give the proper slopes to the sewers the sewage must first be conveyed to a particular point and then pumped up to the entrance of the outfall sewer. The situation of the pumping apparatus is an engineering question merely, and in the project it is proposed to raise the sewage near the lands on which it is contemplated to use it, and where the prevailing winds will not convey the smell into the town. The next point is one which embraces a very important consideration, viz. whether the same system of sewers shall carry off both rain-water and sewage as in England. Capt. Tulloch enters deeply into this question and satisfactorily shows that so exceptional is the rain-fall of Madras as compared with that of England, that if the sewers are to be adapted to carry away both rain-fall and sewage, they will have to be constructed of a discharging capacity four times that of the sewers of London, for the same area to be drained.

"In 1851, the south-west monsoon came down with a tremendous burst—11·45 inches fell in 5 hours. Thus—$2\frac{3}{4}$ inches in the first

hour—2 inches in the next hour—nearly 3½ inches in the next—1¾ inch in the next—and 1¼ in the last. No underground sewers could stand against such a body of water as would flow into them at one of these outbursts of the monsoon. And these extraordinary falls seem to occur at intervals of about 8 or 10 years. I am given to understand that the main sewer of Calcutta is as much as 30 feet wide. While Madras remains poor as she is, it will be folly to attempt the construction of sewers on such a scale.

"It will naturally be asked, 'If the sewers are not to carry away the rain water, how is it to be got rid of?' The answer is—by open channels. I propose, however, at first, to make use of the existing large drains as the outlets for storms. This will, no doubt, cause surprise to many, considering how much the present drains have been abused. It is well known, in drainage engineering, that when the quantity of water is great, the form of the sewer is of little consequence. Whether it has a rectangular section or an oval section, the velocity is still sufficient for all possible purposes. Now, the section of the Madras drains is certainly very far from faultless. Nevertheless for storm waters they will answer admirably. When Madras can better afford it, it will be time to reconstruct these channels, but having them now at hand, I am decidedly of opinion that they should be used. The drains which I propose to keep are not, of course, the open *street* drains in all parts of Madras, but the few large underground and open channels which discharge immediately into the sea, the Cooum, or the Canal. All the street drains should be taken up, for the bricks of which they are constructed are of the worst possible kind and so saturated with liquid filth, that every effort to cleanse the town without the removal of these drains will be ineffectual. At present, all that would be necessary would be to re-place these drains with broken granite, down which the rain water would flow until it ultimately entered, as it now does, one of the large outlet drains. The Municipal Commissioners, who spend yearly about 20,000 Rupees in new drains, would have that sum available for this work, inasmuch as no new drains would be required in the town if this project were carried out. Ultimately it might become necessary to have open channels of stone set in mortar, similar to those in use in England."

Capt. Tulloch next gives a description of the course to be taken by each sewer, and branch sewer, and the outfall sewer; the dimensions, slope, means of cleansing, ventilating, flushing, &c. We will not follow our author here, we have unbounded faith in his engineering skill and believe that he has given such deep consideration to the subject as to enable him to plan a most effectual system of sewers. The pumping station is to be placed a little to the north of the Railway, and north-west of the Mint. It is not intended to have

a large reservoir for ponding up the sewage for many hours. There will be a small well of, perhaps, 8 or 10 feet in diameter, into which the sewage will be led for conveniences of pumping. During those hours of the day when there is little or no sewage to be raised, the engines will be stopped and the sewage will be allowed to accumulate in the main sewer, which, in fact, will be the ponding reservoir, and take the place of those enormous cisterns which are constructed in Europe. The sewage is to be lifted by steam pumps to a distance of 10 feet above datum line and then discharged into the outfall sewer. And as the main sewer will terminate at a depth of about 16 feet below datum line, the average lift will be about 26 feet.

The street drainage is to be effected by means of 9 inch and 6 inch earthenware pipes of English manufacture, with means of flushing and access to the pipes at intervals of about 300 feet.

The very important matter of house-drainage is next noticed, and here we must again quote from the Report.

"The house-drainage will be effected by three and four-inch earthenware pipes laid at as great an inclination in each instance as the internal arrangements of the walls and rooms of the dwelling will admit of. The pipes will start from the back yard of the house and will issue into the street from under the front door of the dwelling. The admirable system known as "back drainage" in England cannot be adopted in Madras. The destruction of property would be so great as to put it entirely out of the question. In London, where there is generally an open yard at the back of every house, there is no difficulty in draining the houses to the rear—in fact, it is cheaper to do so, but in Madras the back-yard to the house is surrounded by small buildings, the destruction of which would be necessary before a pipe could be laid. Every house, moreover, invariably slopes, and some very considerably, *from* the back-yard *towards* the street. To attempt "back drainage" will be to drain the houses against the natural slope of the ground. Many objections may be found and urged against carrying the pipe through the entire length of each man's dwelling and taking it into the street, but long attention to this subject and a careful inspection of numerous dwellings all over the town, have convinced me that this is the only method at our disposal. It is not possible to make use of the present house drains, which are usually channels of about 4 inches square, and run beneath the wall which separates two contiguous buildings, and is common to both. These drains having been built along with the houses, there is no means of getting at them except by pulling down the walls, which cannot be done without causing damage to

the dwellings. In many of the streets, the slopes which have been given to these channels are very slight, and they constantly become choked up in consequence.

"I considered at one time whether it would not be possible to dispense with new house drains altogether, and to use the present channels although they are so defective. But I found, if this were attempted, that the dimensions of the main and branch sewers would have to be enormously increased, and at least six times the amount of pumping power already recommended would have to be provided."

Capt. Tulloch here enters into the consideration of the quantity of ordinary and of extraordinary rain-fall which would enter the sewers if the present house drains were used, and for the discharge of which provision would have to be made. And he then continues:—

"All these considerations have led me to the conclusion that in Madras, where the conditions of rainfall are different to those in England, it would be advisable to effect a perfect separation between rain water and sewage. I would, therefore, leave the present house drains as the discharging channels for rain water, and would lay down three and four-inch earthenware pipes in the manner already proposed in page 102 for the sewage. In every yard, or wherever water may be used within a native dwelling, there would be a small cistern fitted up with a sink. The earthenware pipe, which would run from the back to the front of the house, would, in most cases, pass directly under these sinks and be connected with them by syphon traps.

"To illustrate my meaning, I will take the most ordinary case—a native dwelling with, say, three open yards, one behind the other, and with a well in the back, and another in the front yard. The earthenware pipe would start from near the well in the back yard, and thence pass through the dwelling and out under the front door. It would join the street drain in the middle of the street. Round each well it would be necessary to put up a brick dam two or three inches high—just sufficiently high to intercept the water, and sufficiently far from the parapet of the well to admit of the inmates of the dwelling bathing and cleaning their pots in the space between the parapet and the dam. A sink would be fixed in this open space so that all the water that was used at the well would escape through the sink and pass at once into the earthenware pipe. In many cases the dam would not be required, for there is already a channel from each well, and the sink might at once be fixed in it. Care should be taken not to lay it at the lowest point in the open yard, as, in that case, the rain falling on the roofs of the houses and in the yard would enter the earthenware pipe.

"The house drainage should be carried out under the immediate direction of the Municipal Commissioners. Every house-owner should be at liberty to lay down the drains in his house himself, subject to the approval of the work by the Commissioners, or, if he preferred it, the Commissioners should lay down the drains for him at their own cost, and increase the rate charged on the house by such a sum as in 30 years would amount to the value of the work done with interest thereon."

As to the disposal of the sewage, Capt. Tulloch intends that the connection at present between the privy drain and the house drain shall be stopped, and the former joined to the new earthenware pipe through which all the urine will escape to the sewers. And as to the ordure, he says :—

"I would encourage, as much as possible, the system which obtains at present throughout the town, but I would, at the same time, try to improve it. The abominable smells in all parts of Madras are not produced, as is generally supposed, by the excreta of the population, but by defective drainage. It is the *refuse water* in the houses and in the streets into which all manner of garbage is thrown to ferment and generate foul gases, that creates the dreadful nuisances so much complained of."

And he proceeds to say that all that is required is a proper and constant supervision of the privies, for which he calculates that an establishment costing about Rs. 5,000 per annum would be sufficient. But he adds :—

"The best system for the removal of excreta is the sewer system—provided that plenty of water can be employed to carry away the urine and ordure, and that a liberal use can be made of some deodorizing solution to prevent effluvia. There is nothing equal to the water-closet for cleanliness and wholesomeness. It acts perfectly if deodorizers are used as well as water. Both deodorizing and antiseptic solutions will, before long, be procurable at prices that will admit of their free use even by householders, but many years must elapse before every house in Madras is supplied with water. Until then, I am satisfied, that it will be best to continue the present system."

The subject of the utilization of the Madras sewage is next entered upon and strongly advocated. Capt. Tulloch has selected a spot of ground of which he gives a map with an ingenious diagram, showing that it is most favourably situated for the purpose, as it would be under the influence of winds which would carry any smell to the town, for only a few days in the year. He says, that every town in India has an interest in the decision of this important question.

and could it be proved that the sewage of towns could be profitably and safely applied to land in India, an incalculable benefit would be conferred on the whole country. The great advantage of using the sewage in the way proposed in the Project would be the saving of the expense of the outfall sewer which will cost about three lacs of Rupees. Besides this, the value of the sewage would soon become evident, when its sale might be effected and realize a considerable sum.

The Report concludes with the cost of the Project, the total estimate for all the works being as follows :—

	Rs.
Main Drainage	18,74,047
Street Drainage	9,42,613
Land to be purchased	25,340
Buildings do	20,000
Engines and Pumps of 72 horse power at Rs. 1,500 per horse power	1,08,000
Pumping Station, including cost of putting up machinery and other works	70,000
Total Rupees	30,40,000
Add about 10 per cent. for Sundries and Contingencies	3,10,000
Total Rupees	33,50,000

If Government decide to utilize the sewage, the outfall sewer will not be required, but an irrigation sewer costing about a lac of Rupees will have to be built. Thus the total cost will be 31½ lacs.

The annual cost for superintendence will be about Rupees 9,792 which capitalized at 5 per cent. would represent a sum of about 2 lacs.

Fuel, oil, &c., would cost annually about 13,000 Rupees, representing a capital of about 2¾ lacs.

Repairs will be fully met by ½ per cent. on the cost of the works, say 16,000 Rupees annually, or a capital of 3¼ lacs. Our author says :—

"I will even assume now that the works may cost as much as 50 lacs or half a million pounds sterling. And what will the rate-

payers receive for this sum? All liquid refuse will be removed from the precincts of their dwellings and will be utilized on the land."

And he, of course, takes the opportunity of contrasting this with his estimate of the cost of dry conservancy by which only urine and ordure are removed, which together amount to *one hundredth* part of the sewage.

We have quoted thus freely from Capt. Tulloch's report, partly in order that our readers may have a correct notion of his project, and partly in order that they may have an opportunity of judging of the fairness of the remarks which we have to make thereon.

We quite agree with Capt. Tulloch as to the advantage of properly constructed sewers, we believe it entirely impracticable to apply dry-earth conservancy to Madras, or to any other large town, even if the system were not open to the objection that it leaves the greater part of the sewage unremoved. The Rev. H. Moule is enthusiastic upon the subject, and has even invented an earth-closet for the universal application of his system. The writer in the *Quarterly Journal of Science* before alluded to says :—

"The 'earth-closet' system, as advocated by the Rev. H. Moule, of Dorchester, is scientifically well-nigh as thorough-going as the system of purification by fire. It is even less amenable to objection on the score of offensiveness; but we fear that considerations of expense, as well as the mechanical ones of difficult conveyance and transport, will restrict the sphere of its application to certain public institutions, and render its adoption impossible, at least to any great extent, in private dwelling-houses.

"The ordinary Englishman has an extraordinary horror of domiciliary visitations, and especially does he abhor them when they are of the kind which this system postulates. The economist knows that suspension in water is a cheaper, as the least economical of men knows it is a less offensive, mode of carriage than any modification or adaptation of the scavenger's cart. And, finally, the agricultural chemist thinks, indeed, that earth is the true medium for the deodorization and utilization of sewage, but he thinks also that the true way of acting upon this conviction is to bring the sewage to the soil in the irrigated meadow, not the soil to the sewage in the earth-closet."

We can endorse Capt. Tulloch's statement that the dry-earth system as we have seen it applied is not perfectly inodorous, but only less offensive than other modes of dealing with excrementitious matters. Our experience is to the

effect that nothing short of constant supervision by Europeans will ensure this system being carried out as recommended by its originators. And unless persons can be found who will so appreciate the utility of the so-called "poudrette," as to induce them to purchase it, or even merely to remove it and to supply earth free of charge,—which is not the case in Madras at present,—there can be no doubt of the great costliness of this system. So far as Barracks, Hospitals, Jails, and large Schools, where efficient supervision is readily attainable, are concerned, the dry-earth conservancy will probably be found to be the least offensive and the most innocuous of all systems of removal of excrementitious matters hitherto pursued in this country, and its expensiveness and cumbersomeness may be of no great import in such establishments. But as Capt. Tulloch points out, it cannot supercede drains;—the liquid sewage must be carried away. We consider that, taken into consideration with the utilization of sewage, the dry system must yield the palm to that in which excreta are removed by suspension in water. As regards Madras, it must be remembered that the works for the water supply have actually been commenced, and that in process of time we shall have an abundant supply, so that it is no longer relevant to ask "where is the water to come from?"

It is in respect of the way in which ordure is proposed to be dealt with that we consider that the project before us is chiefly defective. We see no reason why the solid excreta, as well as the urine, should not pass into the house-pipes and so on to the sewers. Capt. Tulloch seems to overlook the fact that by proposing the continuance of the present conservancy arrangements, so far as the removal of solids is concerned, he scarcely relieves the municipal funds of any portion of the present outlay. The same number of carts and a great portion of "the army of toties," will still have to be employed.

Besides this, we question whether Capt. Tulloch is right in his opinion that the removal of excreta to a distance is universal in Madras. Our duties for several years necessitated our paying early daily visits to Black Town, and with this result, that we look upon the open drains as common privies. One must speak plain when dealing with such a subject as sewage and especially with such a dirty town as Madras. We have seen the open street

drains being made the receptacles of ordure, not only by hundreds of children but also by adults; and that the house drains are similarly used is plain, for unmistakable fæcal sewage may be seen dragging its slimy course from the mouths of the house drains (generally a foot or two higher than the street level) into the street drains below. We are not mistaken on this point; "seeing is believing." And yet Capt. Tulloch proposes to leave these house drains, merely cutting off their connection with the privy, and to take up the street drains, and supply their place with broken granite, so as to afford channels for rain-fall. What security has he that these drains will not then be used for the same purposes as now? and then what should be merely storm water will in reality be liquid sewage.

There is in India at the moment we are writing, a large-minded, and what is commonly called a large-hearted, lady, Miss Carpenter, who has made her way to Hindustan on a Female Education Mission. We had the pleasure of conducting this lady through the wards of the General Hospital and were struck by her keen-sighted observation. She has lately addressed a large meeting in Calcutta on the subject of Social Science, and we quote the following from a newspaper report of her speech :—

"Another highly important subject was the popular health and mortality as affected by insufficient drainage and conservancy; particularly in cities. She could not say whether this was as painfully apparent to residents as to strangers. She was glad to know that much was done to check this deadly evil, in Calcutta and elsewhere; but all this experience was precious, and should find record. If the disgusting and poisonous malaria of that part of Madras known as Black Town—and she could hardly speak better of the open drains of Calcutta—were overcome, as it must be in time, the struggle and the victory ought to be history, and be treasured in the volumes of the Social Science Association. Scientific persons will, of course, discuss these things, and the important practical wisdom thus elicited was too precious to be lost."

From a conversation we had with this lady, we know that she is herself in favour of dry-conservancy, but she acknowledged that her experience was almost confined to her own establishment. We agree with her that the disgusting and poisonous malaria of Madras must be overcome *in time,* and, in the interests of our common humanity, we trust that that time is at hand. It is possible that our small utterings may be of little avail in hastening on that time,

but as our editorial duties have caused us to enter upon this subject, the utterings must be made.

Given the acknowledged disgusting and unsanitary condition of Madras, traced to its causes, defective conservancy and—we must speak out—dirty, negligent habits, and apathy born of ignorance ; what are the remedies ?

I. It appears to us that no conservancy arrangements can be effectual without a primary alteration in the habits of the people, and that such alteration can only be secured by a stringent law, rendering the committal of nuisances punishable summarily. There may be some such law existing, for what we know, but if so, it is a dead letter. We do not mean that offenders are not punished on conviction —for we know that persons have been fined *eight annas* each for polluting the Cooum as it runs between the grounds of the General Hospital, and the Body Guard riding school. But what we affirm is, that there is no detective influence at work. We would have rules printed in the vernaculars, posted and freely distributed, and we would also tom-tom the same about the streets and insist on their being complied with.

II. To provide for detection, an efficient staff of Supervisors is needed. What is everybody's business is nobody's business, and to trust to the present Native Police, would be to lean on a bruised reed, for it must be notorious to every one not affected with obliquity of vision that the Police peons are generally great sinners in this respect and look upon the street drains as public urinaries. The labours of such supervisors would, for some time, be arduous. They need begin with the earliest streak of dawn, and though the mid-day's glare might give them some respite, yet as the shades of evening close in, again must they be on the alert.

III. A stringent law and an efficient supervision being provided, we would take care that no open drains existed to afford a temptation to break the law or elude the supervision. In this matter we differ from Capt. Tulloch. We have far too great a respect for his professional talents to presume to differ from him on a point of engineering. So we fully accept his dictum as to the exceptional rain-fall of Madras rendering separate means of its removal necessary. But to guard against the rain-fall drains becoming sewers, we would cut off the connection of the present house drains with the privies, and commencing in the back-

yard, we would re-place the open gulleys with pipe drains, and, giving them a good slope, let them terminate in the street drains. These too we would have closed, and of course, furnished with properly-trapped apertures for the entrance of storm water. We see no reason why there should not be *superficial* closed drains of capacity sufficient to carry off the storm water, as well as deep sewers. We know that it is objected that closed drains get clogged or choked, and that back draughts of foul air may take place. These are matters entirely under the controul of engineering skill, and we have no hesitation in saying that, as regards recently constructed drains, the objections no longer exist. Besides the drains we would have, should not be receptacles for any putrescent matters whatever.

IV. The removal of rain-water being provided for, the sewage must next be considered. And here we have but little to say beyond accepting Capt. Tulloch's project so far as the sewers are concerned. We have already given our reasons for so far departing from his project as to admit solid excreta into the sewers. In order to effect this, we would at once "go in for" water-closets. We know that Capt. Tulloch will agree with us; we have given a quotation from his report which proves this. The only difference between us is as to time. He thinks water-closets will ultimately come into use; we would at once introduce them and enforce their use. Before further remark, we must quote again from the *Quarterly Journal of Science*:—

"The water-closet system for the removal of excreta comes lastly under consideration—a system which, though of recent date, and, out of this country at least, of comparatively limited development, is yet in a fair way towards establishing itself ineradically in the domestic arrangements of the upper classes of civilized nations. Its economical merits rest on the engineering axiom 'Carriage by suspension in water is the cheapest mode of transport'; and its merits on the score of inoffensiveness need no further exposition than a certain country will furnish, in which the water-closet is even now something of a novelty, and known even yet by the name of '*Cabinet Anglais*.' Its demerits are—first, in an agriculturist's eyes, the exceeding dilution to which it subjects manurial matters at all times, and most especially at times when the country is already saturated with rain-fall; and, secondly, from the sanitarian's stand-point, the great liability to derangement under which it labours at times of severe frost in wealthy, and at all times in poorer houses. Of the agricultural difficulty, Mr. Menzies offers

one solution [the separation of rain-fall from sewage as Captain Tulloch purposes], and to this subject we shall recur, addressing ourselves in the meantime to the Hygienic aspect of the system. And it must be confessed that here, as elsewhere, the old proverb holds good, '*Corruptio optimi pessima.*' All efficient, innocuous, and inoffensive as is the in-doors water closet if properly fitted up, it may be made as noisome as, and assuredly will be more noxious than, the old-fashioned out-door retreats, if it be not so fitted up. The precautions to be taken relate, first, to the lighting and ventilation of the room itself; secondly, to the ventilation and trapping of its outlet-pipes; and, thirdly, to the communications which these discharge-pipes are allowed to set up with other waste-pipes. These precautions we will give in the words of Mr. Rawlinson in his paper of 'Instructions and Suggestions to Local surveyors with respect to Main-sewers, Drains, and Water-works.' 'House drains,' says Mr. Rawlinson, 'sink-pipes and soil-pipes, should have means of external ventilation. Down-spouts may be used for ventilation, care being taken that the head of such spout is not near a window. In-lets to all pipe-drains should be properly protected. Water-closets, if fixed within houses and having no means of direct day-light and external air ventilation, are liable to become nuisances, and may be injurious to health. Water-closets should have a day-light window, not a 'borrowed-light' and fixed means of ventilation which can neither be seen nor tampered with. Permanent openings, equal to a slit twelve inches in length and one inch wide, should be provided.

"If these rules and regulations are disobeyed, the house of the richest man in the country may be made, as we know such houses have not rarely been made, as fertile of fever as the most wretched of our town or even of our village alleys. . . . .

"If the water-closet system is fraught with such dangers to those who, *ex hypothesi*, have the power of taking care of themselves, it may seem rash to recommend its introduction among the lower grades of society. But, just as we would recommend the retention (which, indeed, needs no such recommendation) of this system amongst the upper classes, but should imperatively urge the adoption in all cases of the precautions above specified, so, for the poorer part of our population, we believe that the water-closet system, at all events under that particular modification of the ordinary arrangement known as the 'Latrine,' is, after all, the best also. For full details and figures of the different forms of latrine, we refer to the excellent 'Report of the Commission for the Improvement of Barracks and Hospitals,' at page 87;* but the general statement of the relative merits of the latrine and the water-closet which the Commissioners give we will herewith quote:

* See also Clark's Hygiene of the Army in India, p. 107.—Ed.

—'Water latrines,' they say, 'are preferable to soil-pans,' *i. e.* water-closets 'because they are not open to the same objections. They can be made to consume a very small amount of water; they cannot be injured by any ordinary force; they are simple in construction, require very little repair, and are easily kept clean. There are various forms of these latrines in use, but the principle of construction is the same in all. It consists of placing a water-trough under the seating, which is filled to a certain depth with water, and discharged into the sewer or drain once a day at least. The whole process is simple and efficient, is attended with very little nuisance, and is perfectly innocuous to health. The different forms of latrine vary in construction and in adaptation to their object.' The introduction of this modification of the water-closet system into our overcrowded alleys would be a boon indeed, and its machinery in all its varieties, is, or can be made, so simple that it is less liable to derangement, and consequent pestiferousness, than almost any other structure intended for the same purpose."

The agricultural objection to the water-system could not be advanced as regards the thirsty-land of India, more especially with respect to Captain Tulloch's project, as he excludes the rain-fall from his sewers. The hygienic objections we believe also would be *nil*, if the water-latrines are introduced.

We would first introduce these water-latrines into the public latrines of Madras. Captain Tulloch tells us it would be easy to design them so as to admit of natives sitting in their accustomed attitude. If Captain Tulloch's scheme is accepted, it is probable that he may be required to proceed to England to arrange for pumping engines, &c., and to enable him to design pumping station works, and, if so, a portion of his time might be well spent, as concerns the welfare not only of Madras, but, as we think, of every large town in India, in consulting with water-latrine manufacturers as to the modifications which would be required. Mr. Stewart Clark has shown that these machines may be easily adapted to hold and serve a sufficiency of deodorant or disinfectant to render them in themselves perfectly innocuous; and as, of course, their contents must flow into the sewers, by communication of their outlets with the house or street-pipe drains, the advantage of a general disinfection of the sewage might thus be gained. Another advantage which these water-latrines possess is convenience for ablution, the want of which is the great bug-bear in the application of the dry-earth system to latrines for natives. We do not doubt that these water-latrines would soon come into general use. And

we do not doubt also that our views on this subject will be scorned and ridiculed as chimerical and not in accordance with science and the prejudices of the natives. But we read "the signs of the times" differently, and believe that our native fellow-subjects are as open to conviction and as amenable to reason as we are ourselves, perhaps more so than are our poorer compatriots. And with reference to the introduction of this system among the poor, Mr. Rawlinson tells us that it is possible to have a town, such as Alnwick, so "completely water-closeted" that "the very beggars' common lodging houses have water-closets or soil-pans." It must be borne in mind that we are speaking of Madras with, not without, an ample water-supply.

V. We would utilize the sewage. Something must be granted to Capt. Tulloch's skill and all the thought he has given to this matter, and we think that no spot of land could apparently be better suited for the initation of the experiment, in or about Madras, than that which he has selected.

We are anxious to entertain every objection that can be offered to what we have advanced, but facts are stubborn things, and there can be no denial of the success of the experiment of irrigating lands with sewage in England. It may be urged that by following our suggestion of letting the solid excreta be mixed with the liquid sewage the lifting pumps might become choked, or the heating qualities of the sewage be found too great for the crops. We have not the slightest fear that either of these events would happen. But if the free working of the lift-pumps should be interfered with, a proper system of filtration of the sewage before it reached the pumps would be all that would be needed. Or should the pumps work well and still the solids of the sewage act injuriously on the crops, the writer in the *Quarterly Journal of Science* affords the following solution of the difficulty :—

"As it seems to us, then, upon the evidence before us, any town corporation which could command an acre or so of the lightest and poorest land for the reception in open grips and by gravitation of the sewage of from every fifty to every hundred of its inhabitants, might safely count upon a handsome return, in reduction of their local rates, from the sale of the grass crops, they would thus and there raise. But it appears that all these conditions must be present if a pecuniary profit is to be secured, besides, and beyond the great negative saving, which all such disposal of sewage effects, in the

way of prevention of disease. When guano has become scarcer, and the farmer more enlightened, it will be otherwise; but in the meanwhile, it is easy to see that, in many cases, no adequate supply of land may be cheaply available, or that such as may be so, and may have the sandy or loamy constitution which fits it for irrigatory purposes, may yet be situated as to stand in need of an expensive lifting and pumping apparatus; or, finally, that the only available area may be an impermeable clay, and thus be physically unfit for the duties which its chemical character would excellently qualify it for. The observation of the great comparative purity of the water which flows out of the thick felt which the American weed forms now in so many of our ditches and sluggish streams, has suggested to us that, in such unfortunate cases as those we have just specified, arrangements might be made for sending the sewage of towns through a network of ditches filled with this vegetable filter. The growing vegetation, besides setting free into the foul water an abundance of purifying oxygen, would build up into its own substance a quantity of valuable manurial salts, which would make it, worth the farmer's while to dredge it up and plough it into his land. The positive return from such a harvest as this would be small indeed as compared with that of the Italian or other grass from the meadow, which, in such cases, is unattainable, *ex hypothesi*. Still, such a plan, if not positively profitable, would at least be negatively so, by destroying the mischievous and morbific properties of the sewage it dealt with; and thus, as, with the exception of vice, nothing is so expensive as disease, it would effect a real economy."

We have already said that we do not anticipate any need for the execution of such a plan as this. But should it be found necessary, we believe that the sewage thus deprived of its solids would produce ample crops or grass upon the irrigated lands, especially if the effects be supplemented by ploughing into the ground the vegetable matters which may be used as a filtering medium. Such a system of filtering ditches as is suggested in the above extract would not entail any offensiveness, as the sewage would be deodorized at its source.

It cannot be too often or too strongly insisted upon that the success of such a system of sewerage with utilization of the sewage, in Madras, would not be merely a sanitary triumph for this city, but a victory for India in general, or, to use Captain Tulloch's words, "an incalculable benefit would be conferred on the whole country." For what is possible in this respect for Madras is possible in every inland town. Mr. Clark tells us:—"There are very few stations

that could not be drained; I never saw one; drainage is simply a matter of expense, more or less difficult under certain circumstances, of course, but probably always possible. Stations that cannot be thoroughly drained, if any exist, should be at once abandoned."

There is another point, besides the mode of removal of solid excreta, in which we do not quite agree with Capt. Tulloch, viz., in his proposition that the cost of putting down the house drains shall fall upon the house-owners. We know that this is the English plan, but to quote Capt. Tulloch: "The mistake lies in arguing from England to India without considering the different conditions prevailing in the two countries." By far the greater number of house-owners in this country are the house occupiers, and, even if this is not the case in Black Town, yet the owners are not the wealthy people which English landlords generally are. We do not hesitate to say that to insist upon the house-owners directly paying for putting down the new house drains would be to raise the greatest possible impediment to carrying out an efficient system of drainage. We consider that the cost of the house drains should be added to that of the other works connected with the system, the interest upon the first cost of which should be recovered by a general sewer rate. Of course, we are not in a position to say what the increase upon Capt. Tulloch's 36½ lacs would be, but we may make a rough calculation from data afforded by Capt. Tulloch. He tells us there are 32,610 houses in Madras, and we may suppose that on the average each house drain will be 45 feet long. This will give us 1,467,450 running feet, which at one Rupee per running foot (Capt. Tulloch's estimate for 6 inch pipe, is Rs. 1-4 per running foot) would be, say, 14½ lacs of Rupees.

Then we consider the sewer system would not be complete without relaying the present house drains, this would cost probably other eight or nine lacs. And we think also that the present open street drains must be converted into proper covered channels for storm water; and this would cost perhaps other seven or eight lacs. Further, we would put up two water latrines for six persons each in the 100 existing public latrines. We do not doubt that Capt. Tulloch could devise efficient machines of this kind which could be manufactured at a very moderate cost; but the only information that we have is that McFarlane's latrines with

deodorizing apparatus may be supplied at such a place as Agra* at 350 Rupees each, say at 300 Rupees in Madras. This would add to the cost of the scheme other 60,000 Rs.

Again, we have no evidence in Capt. Tulloch's report that he has taken into consideration the existence of numerous parcherries and hamlets in and about Madras, consisting chiefly of shanties or huts, the unsavouriness and pestilence-producing qualities of which absolutely demand attention; so that probably something must be added for drains for these places.

Captain Tulloch's estimate for his project is 36½ lacs, but we say that this sum must at least be doubled before Madras can be made "a model of cleanliness." All Engineers tell us that drainage is simply a matter of expense, and that cheap sewers are a delusion and a snare, but that the sewer system is the cheapest mode of conservancy. All sanitarians tell us that to establish effectual drainage is to diminish the generation of miasmatic diseases, and to mitigate the severity of such as are inevitable,—to convert weak and delicate into strong and lusty citizens,—in short, to preserve health and to prolong life. And does not the end justify the expense? Even should the effectual drainage of Madras cost a million of pounds sterling, would not the money be well laid out? We believe that Captain Tulloch's project, with some such modifications as we have hinted at, would secure effectual drainage, and thus be a blessing not merely for the present generation but for many generations to come; and, therefore, the scheme might fairly be carried out by means of a loan to be gradually liquidated in the course of a fixed term of years. But this last is a question which does not come within our province to consider.

We cannot better conclude our notice than in the words of the writer to whom we are already so much indebted :—

"Of the ultimate triumph of the Sanitarian creed, we will say, in conclusion, we entertain not the slighest doubt. Unbelivers will be converted and nuisances reformed; our houses will be made wholesome, our streets inoffensive and our rivers pure. The strength of those who work, whether by head or with hand, will be less encroached upon by debility and depression; and the sum total of our years, and even of our happiness and enjoyments, will be increased perceptibly."

* Clark's Hygiene of the Army in India, page 130.

Dr. J. Moore Neligan's Practical Treatise on Diseases of the Skin. Second Edition, Revised and Enlarged. By T. W. BELCHER, M.A., M.D. Dub.; B.M., M.A., Oxon; Fellow, Censor, Examiner in Materia Medica and Medical Jurisprudence, and in Arts, and Hon. Librarian, King's and Queen's College of Physicians in Ireland, &c. Dublin: FANNIN AND Co., 1866. fiscp. 8vo. pp. 526.

Skin Diseases; their Description, Pathology, Diagnosis, and Treatment. With a Copious Formulary. By TILBURY FOX, M.D. Lond., Senior Physician to St. John's Hospital for Skin Diseases, &c. &c. London: ROBERT HARDWICKE, 1864. 8vo. pp. 315.

The Action of Fungi in the Production of Disease. By TILBURY FOX, M.D. Lond., M.R.C.P., 1866. Pamphlet. Re-printed from the Edinburgh Medical Journal for April 1866.

A Practical and Theoretical Treatise on the Diseases of the Skin. By GEORGE NAYLER, F.R.C.S. Assistant-Surgeon to the Hospital for Diseases of the Skin, Bridge St. Blackfriars. London: CHURCHILL AND SONS, 1866. pp. 292.

THERE is always some little difficulty in dealing with works on Diseases of the Skin, owing to the fact that almost every Dermatologist has his own views as regards classification. The artificial system adopted by Willan held its sway for many years, but the many objections which can be brought against all systems of classification which are purely artificial have led to various endeavours to establish a natural system. Among others, Mr. Erasmus Wilson, the late Dr. Buchanan of Glasgow, Professor Hebra, M. Hardy and Dr. Tilbury Fox may be mentioned as worthy labourers in this field. But medicine is not an exact science, and so long as this is the case it may be affirmed that a truly natural and pathological classification of skin diseases is impracticable. The difficulties to be overcome are considerable, for what

may appear to be a natural arrangement to one observer, will not satisfy another; the same evidence will produce a different influence on different minds. That the difficulties we speak of are real and not fanciful may be known from Mr. Erasmus Wilson's experience. At first his natural system had a trifid basis, anatomical, physiological and pathological; then he abandoned this for a mixed etiological and anatomical system; and lastly, this has yielded to a clinical arrangement, natural partly as regards the diseases themselves, and partly as to the anatomical connection of the structures affected.

Another difficulty which the uninitiated experience in handling treatises on Skin Diseases is the want of exactitude and uniformity in the nomenclature. For sometimes we find not merely specific but also generic terms applied to different diseases by different authors. We know that the subject of skin diseases is very frequently ignored in systematic courses of lectures on medicine, the teacher looking upon the study of these affections as a legitimate speciality. We ourselves are opposed to all specialities in medicine, because we believe that it is perfectly possible for every medical man to be equally accomplished in all branches of his profession. However an opposition to speciality in practice does not of course imply a disbelief in the utility of special treatises, so we readily acknowledge that skin diseases may legitimately claim for themselves the dignity of an entire volume devoted to their consideration.

The first edition of Dr. Neligan's work is well known and has long held its place as a reliable and thoroughly practical guide to the diagnosis and treatment of diseases of the skin. But since its first appearance there have been made several important discoveries illustrating the pathology of these diseases, and Dr. Belcher has opportunely seized the occasion to edit a second edition of the work incorporating therein the most recent knowledge which has been attained on the subject. Dr. Neligan's introductory chapter affords a very good summary of the different systems of classification which have been proposed; and explains the author's reasons for adhering to Willan's arrangement, with some modifications. He divided skin diseases into ten primary groups:—1, Exanthemata; 2, Vesiculæ; 3, Pustulæ; 4, Papulæ; 5, Squamæ;

6, Hypertrophiæ; 7, Hæmorrhagiæ; 8, Maculæ; 9, Cancroïdes; 10, Dermatophytæ; adding two supplementary groups, Syphilides, and Diseases of the Appendages of the Skin.

The original work comprised in the group or order Exanthemata, the following diseases, Erythema, Erysipelas, Urticaria, and Roseola; and Dr. Belcher claims as an improvement the addition of Rubeola, Scarlatina, Variola and its allies. We do not agree with him; we are rather in accord with Mr. Plumbe who entirely omitted the Exanthemata from the list of skin diseases. However, as the eruptive phenomena of these fevers afford good illustrations of the anatomical structure of papules, vesicles, pustules, &c., a short notice of them, confined to this aspect, may usefully find a place in the introduction to a dermatological treatise. The cutaneous alteration in these affections is so entirely a matter of secondary importance that the diseases themselves are much more legitimately and satisfactorily treated of as properly belonging to the miasmatic order of zymotic diseases. But lest there should be any fear that the ghost of Willan might be disturbed if the term 'Exanthemata' were expunged from dermatology, we would compromise the matter by retaining the order, including therein only the genera erythema, urticaria and roseola.

We have already said that Dr. Neligan's is a reliable treatise, and there can be no doubt that this second edition has undergone considerable improvement at the hands of the Editor. It is no part of our intention to go through the work seriatim. We turn to the Hypertrophiæ and find that Dr. Belcher has much enlarged the account originally given of Elephantiasis, but still we are very much disappointed. To the practitioner in India the descriptions of both E. Græcorum and E. Arabum are meagre in the extreme. We before noticed a complaint of Dr. Fayrer of Calcutta, that it is rare to find a "reference in any of the standard works professing to treat exhaustively of their respective subjects, to the authority, practice or opinion of one Indian Surgeon"* And we now say that had Dr. Belcher referred to the *Indian Annals of Medical Science,*

* By the way we observed in the *Medical Mirror* for September 1866, a very unfair notice, so far as Dr. Fayrer is concerned, of our reference to that gentleman's "Address in Surgery." "There are critics and—critics," and we

he would have found papers by Dr. Webb and Mr. Waring; —and in some of the early numbers of this journal (an opportunity of referring to which could have been afforded him by his publishers) he would have found papers by Mr. Day and Drs. vanSomeren and Montgomery, which would have enabled him, at least, to have given at second-hand a much fuller and more accurate description of both Leprosy and Elephantiasis proper.

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think it quite worth while to quote a portion of the notice we refer to, in order that our readers may see to what lengths some critics may go.

"We will quote a passage shortly from a very able surgical work, which we would recommend most respectfully to Mr. Fayrer's notice. Mr. Fayrer seems to consider that lithotomy is a branch of surgery in which Indian Surgeons are certainly equal to any and every other English or Continental Surgeon, whether dead or alive. He says, '*we count our operations by hundreds;* some of our graduates have cut as many men successfully for stone as the GREATEST LITHOTOMISTS EVER SAW' (!!!) Professor Fayrer is an adept in '*tall*' talk, as our Trans-Atlantic cousins say. We certainly regret that we missed the opportunity of seeing Professor Fayrer, when we were at Calcutta. Lecturing to half-castes, and to natives is evidently very elevating, but we scarcely think that any more elevation is required. Perhaps a few years sojourn in England would sober down Professor Fayrer's style, which, from the following extract, would appear to be decidedly in want of a little wholesome pruning:—'And I might refer to the names of O'Shaughnessy, Brett, Webb, Playfair, Naismith, Aitcheson, Partridge, Bailey and others, as of Surgeons who have had experience in this operation that SCARCELY the Frere Jacques, RAU or CHESELDEN EVER EXCEEDED.' Genius and modesty are often allied. We may have genius certainly among our Surgeons of 'Her Majesty's Indian Service,' as they love to write themselves, but we look in vain for modesty in *one* of them at any rate.

"How is it that we read the following in Mr. Henry Smith's able Lectures on the Surgery of the Rectum? 'Every now and then we meet with cases where a fistula not communicating with the gut may heal up. Such a case has recently occurred to me in the person of a cavalry officer . . . *who came home invalided from India, for the express purpose of having an operation for fistula performed.*' The Surgeons of India, though equal to Cheselden in lithotomy, evidently require a little rubbing up in the surgery of the rectum."

We have no intention of criticizing this critic. We merely say that had Dr. Fayrer been speaking of himself, which he was not, the remarks upon his want of modesty might have been merited. Dr. Fayrer afforded proof of his assertion as regards success in Lithotomy, 'Baboo Ram Narain within a period of 12 years, operated upwards of 200 times with a loss of 7 cases.' And as to numbers he gives a table in which it is shown that in the last six months of 1863 among the operations performed in 180 hospitals in Bengal, there were 623 lithotomies with 65 deaths, a mortality of 1 in 96 nearly. Smith of Bristol (Chelius, Vol. II., page 545) estimates the total number of stone operations in Great Britain at 200 annually! and Thompson (Practical Lithotomy, &c. page 76) says that out of 1,827 cases of lithotomy in English Hospitals, there were 229 deaths, or 1 in 7¼. Facts are stubborn things.

The term Medical Officers of "Her Majesty's Indian Service" was first used by Sir C. Wood in the Warrant dated India Office, 7th November 1864.

We are sure that Mr. Henry Smith never intended the extract from his Lectures to be used as it has been. Had the critic had an opportunity of

We observe that Dr. Belcher has availed himself of the recent researches into the nature of those affections of the skin and its appendages which are now known to be due to, or attended with, the presence of parasitic fungi. But although he preserves the original group of *Dermatophytæ*, he does not include in this all the parasitic affections. As regards *tinea (herpes circinatus)* he leaves it in its original place among the Vesiculæ, and, withholding his own opinion, he merely places in contrast the views of those observers whom he calls the "parasitic theorists" with those of Mr. Erasmus Wilson who calls the *trichophyton* granular or phytiform degeneration. Dr. Belcher's order *Dermatophytæ* comprises only *Porrigo* and *Sycosis*. But in the introduction to this section he just enumerates the "dermatozoa or ectozoa," amongst which he places the Dracunculus! For information respecting the guinea-worm disease, he refers to Mr. Bastian's paper in volume xxiv. of the *Transactions of the Linnæan Society*, and adds the following, which surely might have been left out of his pages without any loss being felt.

"The *treatment* of the guinea-worm disease consists in gently extricating the worm by winding it gradually on a piece of card, during which process, if the worm be broken, much inflammation and sloughing occurs."

We observe that Dr. Tilbury Fox also has a slight notice of this affection, but we are at a loss to conceive how by any tretch of the imagination the *Filaria medinensis* can be considered an ectozoon; or how the dracunculous affection can claim place upon the list of skin diseases, unless the bulla

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seeing Dr. Fayrer when he was in Calcutta, he might have learnt that it is possible for a Cavalry Officer with a fistula to be so shattered in health as to render an operation unadvisable at the time and a return to Europe absolutely necessary for the restoration of his health. The fact of his being *invalided* would indicate that he was sent home for some purpose quite independent of an operation for fistula; although he might himself be under the impression that the local disease was his only ailment and that he was invalided specially to have it cured.

We admire the honest and logical conclusion that, because a Cavalry Officer was invalided with a fistula, the whole Indian Medical Service requires "a little rubbing up in the Surgery of the rectum."

We presume the Editor of the *Medical Mirror* must have overlooked this specimen of "independent medical opinion," for he surely would have sacrificed the "smartness" of his contributor rather than have allowed his pages to be sullied by a gratuitous insult to a large body of his Medical brethren.

which is formed when the filaria endeavours to extrude itself gives it such a claim.

The peculiar feature of Dr. Neligan's work is the great variety of prescriptions therein introduced, and the fulness of the directions for treatment given for each disease. In addition, the work concludes with a chapter on General Therapeutics of skin affections which, with the exception of a few judicious interpolations on the part of Dr. Belcher, stands much as it did in the first edition.

Dr. Belcher says :—

"The system of writing names and quantities in Latin and the directions in English he (the editor) entirely disapproves of, on the grounds that, irrespective of its being unworthy of an educated man, it is a sop thrown to ignorance, and that by encouraging ignorance in a learned profession it directly tends to promote the evils which the writing of directions in English is intended to prevent."

We totally disagree with Dr. Belcher. We do not think that writing directions in English is any proof that the writer is ignorant, any more than that a compulsory use of Latin in writing such directions would insure that the writer possessed a "scholarship above reproach." As the vast majority of the dispensers of prescriptions are not members of a learned profession, we consider that the interests of the patient as concerns directions for use are best consulted by employing that tongue with which both themselves and the dispensers are most familiar.

The work of Dr. Tilbury Fox is one of high excellence and is evidently the production of an accomplished pathologist. The author tells us in his preface :—

"My chief aim has been condensation; consequently mode or style has been almost entirely sacrificed to matter; secondly, general principles of treatment rather than empirical data have been indicated; and thirdly, especial prominence has been given to the diagnosis of the various diseases. My own peculiar views have been obtruded as little as possible on the present occasion; while the views of others, especially those of the leading French and German authorities, have been fairly stated.

* * *

"Skin diseases, strictly speaking, cannot be taught; they must be learnt clinically. Plates and books are worse than useless if the descriptions they portray be not made subservient to, and constantly and critically compared with, actual disease.

"I will only add a hope that soon the dermatological may take its legitimate rank in our medical schools, besides the obstetric, ophthalmic, aural, and dental departments, and not be deserted as a speciality. The Physician must be possessed of all that general medicine can teach before he can become the successful Dermatologist."

Dr. Fox's opening chapter is an admirable synopsis of the general pathology of skin diseases. Like most other dermatologists, Dr. Fox has his own views as to classification, for an examination of which he refers his readers to his little essay entitled "Classification of Skin Diseases," preferring in this systemic work to adopt a modification of Willan's arrangement. This modification is as follows:—1, Acute specific eruptions (contagious). 2, Erythematous (non-contagious), including erythema, roseola, rosalia, and urticaria. 3, Papular; lichen, strophulus, and prurigo. 4, Vesicular; eczema, herpes, miliaria, sudamina; *suborder, bullæ;* rupia, and pemphigus. 5, Pustular; ecthyma, impetigo; *suborder, furunculi,* including boils, carbuncle, and malignant pustule. 6, Squamous; pityriasis, psoriasis and ichthyosis. 7, Tubercular or degenerations; (*a*) *homologous products,* elephantiasis, framboesia, keloid; (*b*) *heterologous products,* epithelioma, cancer, cancroid, rodent ulcer (all malignant), and lupus (strumous). 8, Modifications of existing structures; (*a*) papillary, *e. g.* warts, corns, &c.; (*b*) of the vascular supply, *e. g.* purpura and nævus; (*c*) nerve supply, *e. g.* pruritus, &c.; (*d*) of colour or maculæ, ephelis, lentigo, and other pigmentary changes; (*e*) glands, of the perspiratory; or the sebaceous, *e. g.* excessive secretion, *stearrhœa, ichthyosis sebacea,* and with retention in addition, as in acne, molluscum, cornua, &c. 9, Parasitic; (*a*) vegetable or dermatophytic, as in favus, tinea tonsurans, tinea decalvans (alopœcia), plica Polonica, herpes circinatus, sycosis, chloasma, pityriasis versicolor, and the fungus foot of India. (*b*) Animal or dermatozoic, as in scabies, prurigo and pruritus from pediculi, the pulex (flea), the chigoe, the bug, and eczema, impetigo, &c. from the pediculus capitis. Syphilis is a modifying agency, and does not warrant the formation of a separate class.

This appears to us a very good arrangement, but a little pretentious. There is the same objection to it as we have advanced against Dr. Belcher's classification, viz. the assumption that the acute specific contagious diseases are affections of

the skin primarily rather than secondarily. However Dr. Fox does not enter upon anything more than a simple description of the eruptions themselves, including the typhus and typhoid rashes; and, except as regards Erysipelas, he does not consider the treatment of the acute specific eruptions. Our author treats of Varioloid and Varicella in the same section. He says:—

"These are two well-marked forms in external aspect, though they are by no means always dissociated; they are—

"1. The pustular form, or modified small-pox, properly so called.

"2. The vesicular form, or chicken-pox.

"There are differences of opinion as to whether these have any relation. Now, in epidemics of all kinds we find, while some of the patients have the disease, whatever that may be, in its fullest developed condition, others owing to certain counteracting influences, exhibit what may be termed minor degrees or abortive forms even. This is true of small-pox. The distinction of varicella (vesicular), modified small-pox (varioloid) and variola are well marked in the extreme degrees of either diseases, but they shade the one into the other by insensible stages. . . . Varicella may be regarded as small-pox modified by vaccination; it is able to give small-pox to a sound person by infection. . . .

"*Causation*, i. e. *Relation to Small-pox.*—Varicella is produced by the same cause as variola. It complicates, antecedes, or follows epidemic variola. It may give rise by infection or inoculation to variola."

Now this is a subject the importance of which cannot be exaggerated. If the affection which we term varicella is simply modified small-pox and capable of giving rise to variola, it behoves the physician to be very careful how he deals with cases of this kind. We wish Dr. Fox had furnished evidence upon which the statement is grounded that varicella may give rise to variola by inoculation. We know that the idea of the connection between these two diseases is not new. Dr. Watson* says:—

"Now these mild and irregular forms of variola, both parents and medical man, wishing, I suppose, to believe nothing in disparagement of the protecting power of vaccination, are very apt to consider, and to call, chicken-pox; and this error having been discovered, some persons have rushed to, or rather revived, the opposite

* Lectures on the Principles and Practice of Physic, Ed. 1848, vol. II., p. 805.

opinion—equally erroneous in my judgment—that there is no such substantial disorder as chicken-pox; but that all the eruptions which have passed under that name have really been forms of modified small-pox. Dr. John Thompson, of Edinburgh, is one of the stoutest maintainers of this doctrine. No doubt an eruption of short duration, and vesicular through the greater part of its progress, is often caused, especially in persons who have been vaccinated, by the contagion of small-pox; but a similar eruption proceeds also from another distinct contagion, that, namely, of chicken-pox."

Dr. Copland* tells us :—

"1st. It is very difficult to determine, during a small-pox epidemic, whether the occurrence of that disease among individuals coming in contact with persons infected with chicken-pox is rather the result of this communication, than of the variolous infection which at that moment developes the malady on all sides; 2nd, Vesicular varicella, properly so-called, is not transmitted by inoculation, and never produces variola: 3rd, those persons who consider chicken-pox as contagious, have confounded it with modified small-pox: 4th, Varicella appears in persons who have not been vaccinated, and who have never had the variola; consequently, in such cases, it cannot be regarded as a variola modified by the prior existence, either of this disease or of vaccination: 5th, Vaccination practised shortly after the disappearance of varicella pursues its course in the most regular manner, which never happens when vaccination follows variola: 6th, the progress of varicella is uniformly the same whether it occurs before or after vaccination, or after variola: 7th, variola sometimes reigns epidemically, without being accompanied by varicella; and on the other hand, the latter may become epidemic without being attended by the former. In fact, the characters of the eruption, and the symptoms of varicella, differ essentially from those of variola."

And upon the point of the inoculation of varicella we may quote the following from Dr. G. Gregory† :—

"Dr. Willan has a chapter expressly devoted to the inoculation of varicella, but the evidence on which the author relied as establishing the fact is slender and unsatisfactory. Four cases only are recorded. In two of these the experiment was confused by variolous inoculation being practised at the same time. In one case no result followed. In the only case which can be in any degree relied on as affording a presumption that chicken-pox is communicable by contagion, a small vesicle raised upon a red and somewhat hard basis was discernible on the twelfth day, followed by two small vesicles

* Dictionary of Medicine, vol. i. page 313.

† Cyclopædia of Practical Medicine, vol. iv, page 435.

on the shoulder which disappeared in two days. It is obvious that nothing satisfactory can be deduced from such an occurrence.

"The experiments of Mr. Bryce, to determine the question of varicellous inoculation, are far more decisive. The author states that he had taken lymph from the vesicles of true varicella, with the greatest care, at all periods of the disease and at all periods of the year; that he has himself inoculated, and seen others inoculate with it, children who had never undergone either small-pox or cow-pox, to the number of thirteen, yet in none of them was the disease nor anything like small-pox, ever produced. In one or two cases a slight degree of redness was observed for two or three days; but in all the rest no effect followed. These experiments are now justly considered as having settled the question, and satisfactorily shewn the impossibility of propagating the genuine lymphatic or infantile chicken-pox by inoculation."

There is no denying Dr. Fox's statement as to the simultaneous occurrence of variola and varicella, any more than one can deny the simultaneous occurrence of other eruptive fevers such as morbilli and scarlatina. But is the connection more than accidental? Within the last seven weeks we have had under our care four cases of variola—one confluent after vaccination,—eight cases of varioloides, seven of varicella and fourteen of morbilli. Many of these cases were under treatment at the same time. Cases of measles and varicella were brought from the same or contiguous house, as were also cases of varicella and varioloides. We have not the slightest doubt of varicella being due to a specific infection as distinct from that of small-pox as that of measles is. Our custom is to isolate small-pox cases whether natural or modified, but to treat varicella in the general wards of a Hospital, and we have never had any reason to regret this.

We can confirm the statements of Drs. Copland and Gregory that varicella often occurs in unvaccinated children; we have repeatedly seen the disease in young "unprotected" infants. As regards the results of inoculation, we know of no experiments beyond those alluded to by Dr. Gregory. One affirmative instance would, of course, be far more valuable than half a dozen negative ones, but a satisfactory affirmative instance has yet to be adduced. We cannot help thinking that Dr. Watson is quite right and that the question of the unity or duality of the variolous and varicellous poisons has arisen from a loose diagnosis. And further we believe that it is by no means unusual for the force of epidemic influence to be vastly undervalued,

and infection or contagion to be hastily assumed whilst epidemic power is ignored.

Dr. Fox notices Elephantiasis shortly ; he shows that his book was written chiefly for European students, by saying:—

"As this is a disease which the student is unlikely to meet with, I shall content myself with giving a brief summary of what is known of it".

Our author has had opportunity of consulting the abtracts of the papers of Mr. Waring and Mr. Day, which appeared in the *Medico-Chirurgical Review,* but by a curious mistake he alludes to "Mr. Day's Researches in *Cochin* CHINA," although he says the disease is common in Malabar. In treating of Elephantiasis Græcorum Dr. Fox avails himself of the researches and descriptions of Dr. H. V. Carter of Bombay. We do not think the article on Leprosy would have suffered if the author had had opportunity of comparing some of the statements made with the results of the experience at the Madras Leper Hopital as detailed by Dr. van-Someren in vol. iii. of this Journal.

Dr. Fox is quite right in saying that his efforts at condensation have sometimes caused a sacrifice of style. At the conclusion of a very good article on *keloid* we read :—

"*Diagnosis.* The elevated tuberculous tumour with the claw-like processes, the puckered state of the skin, the absence of ill-health, glandular enlargement and ulceration, are diagnostic. In regard to the treatment, nothing is known ; excision is useless ; the other thing to be done is to improve the general health and to use locally mild absorbents in the shape of iodine preparations."

We do not quite understand why such diseases as Carbuncle, Rodent Ulcer, Epithelioma, and Purpura are classed with skin affections. Why should other ulcers, other cancers and other dyscrasiæ be omitted? But *chacun à son goût.*

We have read with considerable interest, and we trust with some profit, Dr. Fox's chapters on Modifications of Existing Structures; Parasitic Diseases ; and the Syphilodermata. From the latter we find that our author has seen at least one number of this Journal, for he alludes to Dr. Brodrick as having called attention to substernal tenderness as a diagnostic mark of acquired syphilitic taint.

The work concludes with a copious and useful formulary. We cannot too highly praise the thoroughly scientific and

practical character of this treatise, and we cordially commend it to the notice of our readers as either a student's text-book or a reminder for the busy practitioner. The typography is remarkably clear and the paper thick and good, no small recommendation in a book which has other uses than one simple perusal and a place on the library shelves.

Dr. Fox's pamphlet on the Action of Fungi in the production of Disease, from the Edinburgh Medical Journal for April 1866, has probably come under the notice of most of our readers. It is a supplement to his admirable treatise on Parasitic Affections of the Skin, and, as it is a very thoughtful paper, an hour may well be spent in its perusal.

It embraces an enquiry which branches in three directions.

I. Are the so-called parasites vegetable or not, in nature?

II. Are not most of the forms usually considered distinct, but varieties of a very *few* perhaps *one*, species?

III. Are fungi "accidentals" in disease, or do they necessarily directly or indirectly cause any special morbid changes; if so, of what nature are these?

On the first point, our author says:—

"It is admitted on all sides, with scarcely one single exception, that the fungi met with browsing upon and within our surface are really of vegetable nature, that the germs are derived from the exterior, and that there is no such thing, as some have indeed imagined, viz., a conversion of the elementary particles of the animal structures by a process of degeneration into those of vegetable nature, may I say a heresy that would uproot every sound principle of physiology, an ultra polymorphism which denies *in toto* the existence of any law of limitation, the inter-dependence of life, and whose fair application legitimately carried to its fullest extent would arrive at a *reductio absurdam* the most amusing."

This is a hard hit for Mr. Erasmus Wilson and his supporters. But Dr. Fox is not content with bare assertion; he offers proof of the vegetable nature of the parasites.

1. The cryptogams vegetate freely when removed from the presence and influence of all living animal structures. We have ourselves lately had instances of this with regard to the favus *Achorion* and the *Chionyphe Carteri* of Madura foot.

2. Spores, sporules and mycelia resist the action of re-agents, especially of liquor potassæ, whilst animal structures swell up and become indistinct under the influence of these re-agents.

3. Identical parasitic structures may be found in the hard tissues of animals and indeed of vegetables.

4. The want of transitional forms. Normal nuclei may be confounded with sporules, but liquor potassæ will determine the difference. Directly the tubed phase (mycelial) commences, all similarity goes at once.

5. If the so-called fungus is a granular degeneration, such degeneration must commence where the nuclei are formed, and abundant in the early developmental stages, viz., at the formative papilla of the hair. But the earliest trace of spore, sporule,or mycelium is subepidermic and located at the upper part of the hair follicle, from thence it may be traced downwards to the bottom; so that there is *à priori* evidence that the germs of the parasite are derived *ab externo*.

6. Remove or destroy every vestige of parasite, in the early stage particularly, and the disease is stopped. To affirm that this could alter such a thing as "granular degeneration" is not conceivable.

II. As to the *variation* of fungi. De Bary has shown that fungi which do not infest the human body, and which have been described as distinct species, as uredo, uromyces, puccinia and œcidium, are varying forms of the same fungus. Dr. Fox enters somewhat fully into this subject and concludes thus:—

"If I were asked to sum up briefly the results of the most recent minute observation, I would say that the parasitic fungi found upon *the human surface* are varieties which cluster around the penicillium or torula in their sporular state as the type; that in the air the tendency is to the aspergillus form of fructification; that the parasites of the mucous membranes, or entophytes, are more or less forms of oidium, mycelial forms of the sporous state of penicillium; that sarcina is a conjugated form of the latter. Chionypte Carteri, the fungus of the Madura foot, being nothing more or less than a higher stage of the oidium, approaching closely the genus mucor. I do not comprehend the distinction of aspergillus, penicillium and mucor *as seen on the human surface*, having noted all the appearances supposed to be characteristic of each, in the development of the same fungus penicillium taken from the

contents of the stomach of a pyrotic patient. Human parasitic cryptogams furnish capital exemplification of polymorphism ; our duty is plain : to investigate and define the special diseased conditions which are related to and indicated by special phases of fungus."

The *modes of entrance* of the fungi are next considered; the summing up being as follows :—

1. That through the natural orifices : 2. That in which the growing force forces the mycelial thread beneath the layers of the superficial tissues ; 3. That in which processes shoot out from the spore and enter by such openings as stomata ; 4. That where the cell contents are absorbed ; 5. That in which the spores are carried bodily inwards by growing parts ; or (6) dissolve away the opposing structures by chemical action ; or (7) enter by traumatic lexions. In each and every instance the germs of parasites are derived *ab externo* and not generated *spontaneously.*

III. For the third point we must refer our readers to Dr. Fox's pamphlet. He points out that parasitic disease "consists of three distinct components, which must be recognized, if the physician would cure his patient well and quickly."

1. A certain state of soil : each variety of fungus appears to require its special kind of pabulum.

2. The access of air, and the presence of heat and moisture,—the conditions necessary to support the life of fungus.

3. The introduction from without to, and action upon, the body of the vegetable germs.

Upon this latter point Dr. Fox shows that fungi may act—1, mechanically, producing irritation ; 2, by inducing local chemical change ; 3, as conveyers of poison ; and 4, as developers of poison (zymosis).

"Parasitic disease, then, is a composite affair, consisting of mal-nutrition, a growing parasite, and certain effects of such growth."

This subject is an extremely interesting one, and as India affords abundant examples of epiphytic and endophytic disease, a fine field of investigation is open to any medical man who has a good microscope and plenty of leisure at command. The subject is not exhausted, multiplication of facts

is required, and it is within the bounds of possibility for a careful observer to immortalize himself as regards general parasitic disease, as Carter of Bombay has done with respect to mycetoma.

The work, the title of which is placed last on our list is, we believe, the latest published systematic treatise on dermatology. Its author was a few years since an Assistant Surgeon on the Bombay Establishment, and was unfortunately compelled by ill health to resign his commission.

The book is dedicated to Mr. Startin, "teacher and friend" of the author. As Mr. Startin fulfilled the former office it would have been Mr. Nayler's own fault if he had not arrived at the position, which his work shows he has attained, of a skilful dermatologist.

As regards classification, Mr. Nayler acknowledges that the obscurity which envelopes the pathology of skin disease militates against the completeness of any system, but he is not acquainted with any which, in utility, can supply the place of that of Willan, which is still followed both at home and abroad.

"In the present volume, the squamous, papular, vesicular, and pustular affections are comprised in as many groups. Other diseases as, for example, lupus, elephantiasis, and alopœcia, which have their own distinctive characters, are arranged separately. If exception be taken to those which, arising from a vegetable parasite, more properly pertain to a special order, as pityriasis versicolor, tinea tondens, and favus, the author may reply, that he has preferred to retain the names by which these complaints are best known; their re-arrangement as a class by themselves would be unattended by any practical result."

As regards the first two sentences in the above paragraph we have nothing to say beyond congratulating ourselves upon meeting with a work on skin diseases, from which such affections as the exanthemata, cancers, and ulcers are excluded. But we fail to see the logic of the last sentence, which says in effect that because the author prefers to retain the best known names of certain affections, there would be no convenience in classing them as a special order. It may be true that if the parasitic nature of certain affections is fully recognized no *practical* result would occur from their arrangement in a class by themselves, but surely the *unities*

would be better preserved, and pathologically there would be some attempt at a *natural* classification.

We make no pretension to having read the whole of Mr. Nayler's book, it reached us too late for that to be possible; but we have perused sufficient of it to enable us to say that we think the above subject (and that is unimportant) the only one upon which we could possibly join issue with our author.

The first chapter is devoted to the anatomy—and we might add, partly to the physiology—of the skin and its appendages. It is very carefully written and beautifully illustrated by six plates by Tuffen-West and Aldous, chiefly figures copied from preparations in the Museum of the Royal College of Surgeons. Some of these plates are coloured, such as those illustrating the arrangement of the blood vessels of the skin and those beneath the nails. So familiar do the latter appear to us that they might very well have been copied from some fine injected preparations, by Mr. Rainey, which are in our possession. Plate vii. illustrates the structure and development of the Acarus (Demodex) folliculorum and of the Acarus (Sarcoptes) scabiei. Plate vi. affords good illustrations of some vegetable skin parasites, Achorion Schönleinii, Microsporon furfur, and Trichophyton tonsurans.

Mr. Nayler's descriptions of disease appear to us to be very faithful. They are free from diffuseness, perfectly clear, and succinct without any loss of perspicuity. To a certain extent the book partakes of a clinical character, illustrations being afforded by reference to cases which have been under the actual observation of either the author himself or some of his friends. His position as Assistant Surgeon to the Hospital for Skin Diseases in Blackfriars ensures that all that is said as regards therapeutics is of the most reliable character, and embraces the most modern experience. We observe that he speaks very highly of carbolic acid as a lotion in Psoriasis and Lepra.

As regards some disputed points we have referred to Mr. Nayler's work, and we find that he is of opinion that Alopecia areata is not a parasitic disease. He alludes to Bazin and Hardy as holding the opposite view, and to Mr. Hutchinson as having once detected the microsporon, but his own researches have been fruitless as far as they relate to the discovery of a fungus. And as regards Sycosis he has, in a few

instances, discovered the parasite, but he believes it is seldom present, and that its presence, when it exists, is accidental, and not an essential condition of the complaint. Concerning the term Porrigo, Mr. Nayler says :—

"I purpose to limit its signification to one disease, and accept the definition of it as proposed by Mr. Startin, viz., that it consists of an eruption of large flat pustules, covered with thick crusts, and is contagious; it occurs on an otherwise sound skin, without a surrounding inflammatory base."

Our author has not discovered a parasite in this affection, but he figures a particular condition of the hair which, so far as he knows, is peculiar to Porrigo :—

"The hair bulb becomes flattened and expands into a broad and thin plane, which terminates in an even edge . . . Fig. 1 is club-shaped, but this character is witnessed in other cutaneous complaints. The lower part of each hair, extending to the bulb, exhibits a series of irregular rings; but this, again, is not peculiar to porrigo, although well exemplified in this disease."

The above quotation affords a very good specimen of the care with which any statement is advanced by Mr. Nayler. As concerns Herpes circinnatus (tinea circinnata) and Favus, Mr. Nayler admits that they are undoubtedly due to the presence of a fungus.

Our author's Indian experience has enabled him to write a very readable and correct account of Elephantiasis. He has had opportunity, of course, of referring to the recorded observations of his former confrères of "Her Majesty's Indian Service" and fully avails himself of the same.

There is but one point which we feel inclined to notice. Mr. Nayler, speaking of E. Arabum, says :—

"It sometimes happens that during the febrile paroxysm a clear discharge exudes from the skin of the scrotum. This is always a favourable sign, and seems to be an effort of nature to throw off the disease."

We are not quite sure whether our author is here alluding to the same circumstances that we have in our minds, but we have several times observed in *small* scrotal elephantoid tumours, especially towards the more depending parts, small semi-globular elevations, covered by the thinned integument, varying in size from a small split-pea to a pin's head, and evidently containing fluid. In the first case we met with, some of these little tumours had given way and

there exuded a large quantity of a slightly opaline fluid, which presented all the characters of lymph, coagulating, upon standing, into a soft jelly-like mass. In other cases we have punctured many of the swellings with the point of a lancet, and from one patient have collected as much as twenty ounces of lymph in twenty-four hours; and the flow has gone on for several days. The patients were not suffering any febrile paroxysm at the time. We know not the subsequent history of the patients, but we are under the impression that the discharge of lymph had the effect of arresting, at all events, any speedy increase in size of the tumour. We have not obtained this lymph from any of the large, and more advanced scrotal tumours; neither have we observed any of the little fluctuating swellings in elephantiasis of the extremities, though we by no means deny that they may exist there, in the earlier stages of the disease. The tumours we allude to are most probably dilatations of the superficial lymphatic vessels; and their having been noticed chiefly on the scrotum may be accounted for, perhaps, by the greater relative delicacy of the skin of this part. We believe that almost all observers who have written upon elephantiasis have mentioned that pain and tenderness in the course of the lymphatics of the affected part is usually noticed during the febrile accession,—and we lately saw some remarks upon the elephantoid affection of the lymphatics in one of the English medical journals, but we regret to say that we omitted to take any notes, and therefore cannot refer particularly to them.

Mr. Nayler's work concludes with a chapter on a very important subject, viz., Diseases of the Skin following vaccination.

We say the subject is an important one, because it is our belief that it lies at the root of the general prejudice against vaccination. Among all classes in England we have repeatedly heard the objection "Oh! yes, it is true that vaccination will prevent small-pox, but it gives rise to other eruptions and to bad disorders." We think that the Profession has its prejudice on this subject, and will not give credence to the statements of laymen, and pooh pooh them with the reply "*post hoc, sed non ergo propter hoc.*" Mr. J. Simon very strongly contested the transmission of syphilis by vaccination,—and of course this is the one point in the discussion which is most worthy of consideration. Mr. Nayler relates

three cases which he thinks cannot be explained except on the belief that syphilis has been transmitted through the medium of vaccination. However, he says the cases are infrequent, and do not affect the more general question of its vast and undoubted utility. We merely allude to the subject here to impress upon all vaccinators the propriety of attending to one of the rules laid down by Dr. Tilbury Fox:—"Be very careful not to use the vaccine matter which has been taken from any member of a family in which syphilis has occurred."

In concluding this notice of Mr. Nayler's book, we must congratulate him not only upon his own share therein, but also upon the attractive nature of the "getting up." To mention the Messrs. Churchill as the publishers is to give a guarantee that every thing has been done to secure artistic execution. The illustrations we have already spoken of as beautiful; the type is very clear and the paper is of that delicate toning so much approved of by ophthalmologists.

A Handy-Book of Ophthalmic Surgery for the use of Practitioners. By JOHN Z. LAURENCE, F.R.C.S., M.B., (University London), and ROBERT C. MOON. With numerous illustrations. London: R. HARDWICKE, 1866. 8vo. pp. 160.

THE authors of this little work, which is quite correctly designated a handy-book, are respectively Surgeon and House Surgeon to the Ophthalmic Hospital in Southwark, and they tell us in their preface that the practice they describe is that pursued at this Hospital where 6,000 patients are treated annually. "During a period of upwards of eight years the 'letters' of all our patients have been preserved and bound up at the end of each year. Thus the experience, on which the practice we advocate rests, has the guarantee of the written records of several thousand observed cases." These records have been availed of also to serve as illustrations of disease, thus we find thirty-four representative cases distributed through the book.

Condensation has been one of the chief aims of the authors; thus they tell us:—

"In describing symptoms, we have limited ourselves to those which are essential for the *recognition* of disease; in describing operations, &c. to those details which are essential for its *treatment.* At present it matters little to the practitioner whether glaucoma depend on a hypersecretion of the fluids of the eye, or on a rheumatic state of the circulation, or on an obscure affection of the ciliary nerves, &c., what he chiefly wants is, how to know glaucoma; and, when he knows it, how to treat it."

Of course our authors do not intend to intimate that the consideration of the pathology of the diseases they describe is unimportant, but that, as their only object is to supply the wants of "the busy practitioner," any discussion of disputed pathological points would be out of place in their work and foreign to its character.

Ophthalmic, and especially Ophthalmoscopic, Surgery has been so fully discussed in the pages of this Journal, not only in the interesting and scientific contributions of Dr. G. Smith, but also in the able review* of Mr. Jabez Hogg's Manual, which appeared in our sixteenth number, that we have no intention of entering on any enlarged notice of the work before us.

The book is divided into seventeen chapters; the first of which is on the methods of examining the eye; and of course a succinct description of the ophthalmoscope is to be here found. The authors select Liebreich's monocular instrument and Laurence and Heisch's modification of the binocular of Dr. Giraud-Teulon, for description; and short instructions are given for their use. The chapter includes also the modes of investigation of visual power, the refraction and accommodation of the eye, the extent of the field of vision, and the existence of binocular, uniocular, and double vision.

The second chapter contains some general remarks on ophthalmic operations. The authors are much in favour of the use of a head rest in all operations on the eye, and they

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* We have no hesitation in characterizing the Review alluded to by the adjective "able," and we are not overstepping the bounds of modesty in doing so, for it did not emanate from the Editor's pen, but was kindly furnished by an accomplished oculist.

figure an apparatus—a cephalostat—invented by Mr. Laurence, which appears well adapted to answer the purpose intended. Supposing that there are no contra-indications to its use, it is recommended that chloroform should be employed to complete anæsthesia in ophthalmic operations; the authors specially inculcate its use in the extraction of cataract, believing that preconceived opinion has been invoked, in place of experience, in attributing expulsion of the vitreous and intraocular hæmorrhage to vomiting resulting from chloroform inhalation.

The subsequent chapters are on the diseases of the orbit; eyelids; lacrymal apparatus; muscles of the eye; injuries of the eye and orbit; diseases of the conjunctiva; sclerotic; cornea; iris and ciliary body; and crystalline lens; amaurosis and amblyopia; glaucoma; diseases affecting the whole eyeball; on vision; and optical defects of vision.

As a specimen of the manner in which our authors deal with their subject, we will quote a complete section from their fourth chapter.

"*Ophthalmia Tarsi*, or inflammation of the edges of the lids, presents some special characters. It occurs in a sub-acute or chronic form, very commonly in scrofulous children. The tarsal borders of the lids become red and thickened, and matter accumulates at the roots of the lashes. These thus become glued together; especially the first thing in the morning. The tears secreted in excess, in consequence of the inflammation, overflow the palpebral sinuses, run down, and excoriate the skin of the cheeks. The lashes often become loose, and fall out; and, in old chronic cases, may all disappear, leaving a raw, red, smooth, and thickened margin to the lid, constituting that very intractable condition known as 'lippitudo.'

"There are two very common conditions of the puncta lachrymalia, which are frequently met with in lippitudo (especially in old people), which may, if overlooked, render the most protracted treatment ineffectual. We find the puncta everted, turned away from the surface of the eyeball, or skinned over by plastic membrane. In either case they no longer fulfil their physiological function—that of receiving the tears as they distil down over the surface of the eyeball. Hence arise watering of the eye, a continuance of the chronic conjunctivitis, and even ectropion—all three effects acting and re-acting on each other, so as to form an accumulated fund of discomfort to the patient. Such cases, after having been treated *ad infinitum* by all varieties of lotions and ointments, we have,

over and over again, seen cured at once by slitting up the canaliculus. Effects had previously been mistaken for causes.

"The treatment of ophthalmia tarsi consists in warm fomentations or poultices to the edges of the lids, and removal of the crusts of matter, followed by the application of the red or yellow ointment to the diseased surface beneath. In the lippitudinous stage, occasionally pencilling the tarsal conjunctiva just within the free edge of the lid with nitrate of silver will be found a valuable adjunct to the above treatment."

There are some points in the practice recommended by our authors to which exception might be taken. For instance, all that they say regarding the treatment of chemosis is as follows :—

"Both forms should, if necessary, be treated by scarification with a lancet, or, if the vitality of the cornea should appear threatened, by excision of the morbidly thickened structures with curved scissors."

We contrast this with the following extract from Dr. G. Smith's Lectures on the conjunctiva in health and disease :*—

"Chemosis is best removed by pressure. In some cases the warm water compress, is the most useful; in others the cold water compress, and in others the dry compress answers best. Astringents such as the acetates of lead, alum, or of zinc are also of great service. It was at one time the practice to scarify congested lids, and to incise the chemosed conjunctiva in cases of conjunctival inflammations of the catarrhal and purulent types; my own experience is against the practice, but in favour of pressure combined with cold or heat."

As regards Iritis our authors say :—"Mercury is generally regarded as the *sine quâ non* in the treatment of iritis; we, however, do not give it; our cases, we find, get on as well without it."

Concerning the extraction of cataract, the experience at the Southwark Hospital is, in respect of flap-operations, in favour of that of Mooren performed under the influence of chloroform. But of all the operations hitherto devised, Messrs. Laurence and Moon prefer, in proper cases, Mr. Critchett's modification of Waldau's (Schuft's) operation.

* See Page 75, No. XIX. of this Journal.

They object to the original operation of Schuft on the grounds that the incision of the cornea is too small, so that either the cortex of the lens is rubbed off during its extraction, or the iris and lips of the corneal wound are bruised; and the spoons are far too bulky; either the lens is broken, or the hyaloid fossa is ruptured. They consider that enlarging the incision to from one-fourth to one-third of the circumference of the cornea, and the substitution of Critchett's spoon for that of Schuft (the edges of the latter being too high and rough), leave nothing to be desired in the shape of an extraction operation. They do not mention the modification of Schuft's operation practiced by Dr. Macnamara of Calcutta.

Our authors are so assured that iridectomy is absolutely *the* remedy for acute glaucoma, that they consider it "almost criminal" to temporize with the disease. They do not notice division of the ciliary muscle as proposed by Mr. Hancock, as a remedy for glaucoma, but we may remark that Dr. G. Smith finds this more simple operation quite efficacious, and far better borne by the native eye than iridectomy. Full directions for its performance will be found at page 378 of vol. viii. of this journal. Our authors say that it is an undeniable fact that certain sub-acute cases of glaucoma recover under general treatment—belladonna and iodide of potassium internally, and atropine topically.

The chapters on Optics and the Optical Defects of the Eye are carefully written, and contain some very interesting matter, but the space at our command forbids us to further allude to them.

The book is handsomely got up. The paper is good and hot-pressed which gives a great clearness to the wood-cuts which are good specimens of the art. Although the number of pages it contains are but 155, yet by the use of small but very clear type they have been made to hold a great amount of matter. Mr. Hardwicke certainly rivals the Messrs. Churchill in the elegance of the books which bear his imprint. We recommend this handy-book to our readers as likely to be of great assistance to them in the diagnosis of cases in which difficulty may be felt.

The Madras People's Almanac and General Directory, for the year 1867. Madras: GANTZ BROTHERS, Royal 8vo. pages 450, and Appendix lv.

THE People's Almanac is as much one of the "institutions" of Madras as is the People's Park with which it is coeval, and which is the only "institution" of which we can find no notice in the volume before us. The present is the eighth year of the existence of this Almanac, and certainly it has been a progressive work, for every issue has been an improvement upon its predecessor. The publishers have this year added the rules and regulations of the Civil Service, "so that now every branch of Her Majesty's Service is fully represented." They call attention to "a classified table of contents adopted in lieu of the usual unwieldy index," but we do not quite agree with them that this is a great improvement, because so much depends upon the taste and fancy of the classifier, and there can be no doubt that nothing so facilitates reference as a good alphabetical index. At all events if the "classification" is retained, we would suggest that at least the heads and the items under each head should be arranged alphabetically.

The book is very neatly got up and wonderfully cheap. It will be found to save its possessor an immense deal of correspondence and reference upon various matters, inasmuch as it contains full information upon all such subjects as the Railways, Steam Navigation Companies, the Carrying Company, the Postal Department, Stamps, Custom House rules, &c., and the regulations and office-bearers of Societies and Associations of every kind and description, together with both a Mofussil and Madras Trade List. Of course there are some inaccuracies as regards office-bearers, as changes occurred in some instances whilst the book was passing through the press, but these are few and of no import.

As immediately concerning the profession, we find a complete list of the Medical Establishment, and on pages 431 and 432, what cannot but prove useful, not only to practitioners but also to expectant mothers, a table containing the names, race, date of certificate, qualification and residence of 87 qualified mid-wives and monthly nurses.

We recommend the work to the notice of our readers, as an indispensable companion to the writing table.

PART III.

MEDICAL MISCELLANY.

No. 1.—*Notes of a Case of "Scarlatina Rheumatica" or "Dengue."* By Surgeon H. R. Oswald, M.D., Surgeon to the Mysore Commission.

C. B., an East Indian boy of fair complexion, aged 12 years, was attacked on the 8th December 1865 with the ordinary symptoms of continued fever; they were not severe, and there was nothing unusual in the case, except that he complained of a pain in the right knee extending to the ankle. The fever continued on the 9th without abatement, but was not strong, his pulse not going above 100.

On the 10th, an eruption appeared all over the arms and legs, and face, exactly resembling the eruption, as it first shows itself, in Scarlatina; there was no throat affection whatever; the febrile symptoms were increased, there was pain in the eye-balls and a good deal of injection of the conjunctival vessels; the pain in the knee continued the same.

On the 11th, the eruption had come out much more distinctly: it was bright scarlet, covering the face and extremities, very little on the trunk; the pain in the eye-balls, and injection of conjunctival vessels continued unabated as well as the fever; there was still no affection of the throat.

On the 12th, the above train of symptoms continued without any mitigation; the eruption, in fact being more intense; he also began to complain of pain in all the joints, which were excessively tender to the touch; the ankles, and wrists were slightly swollen, the face likewise was a good deal swollen, and the eyes continued much inflamed. He said his eyes felt too large for his head. The urine was not very

high-coloured. The pulse 100. The throat still continued free, nor was there any glandular swelling about the neck.

It is needless to follow the case day by day any further, as the symptoms continued much as related above, except that the fever, for a few days, showed a decided tendency to increase about 10 A. M. and to remit at 4 P. M.; and there was a slight affection of the mucous membrane of the nostrils, but none of the throat; the pulse never rose above 100, was more generally 96, and sometimes inclined to intermit. The rheumatic symptoms were very severe, and he was for several days quite unable to stand or feed himself.

On the 23rd December for the first time the fever decidedly abated, and the eruption was perceptibly paler; the rheumatic pains and swelling of the joints had likewise much abated, and he was able to stand and feed himself.

On the 25th, he was quite free from fever and pains in his joints, and the eruption fading.

27th.—Eruption still fading, skin *desquamating*, and nothing to complain of except debility.

4th January 1866.—Skin desquamating *very freely.* Eruption not yet disappeared. Is very well, but still weak.

On the 1st March, the skin had not yet recovered its natural clearness (it did not do so for some time after) and assumed a dark hue on any excitement; the boy is, however, in perfect health.

The treatment consisted of mild aperients, diaphoretics and opiates (which were well borne) with small doses of the Iodide of Potassium and Bicarbonate of Potash. Nothing except the opiate seemed to have any influence on the disease.

The foregoing is an abstract of a case of what appears to me to be "Scarlatina Rheumatica," and which I believe to be now a very rare disease. The case exciting a good deal of interest and attention, at the time, amongst the boy's friends, who are influential East Indians, enquiries were diligently made by them, for similar cases amongst the natives, some of whom professed to know the disease well, and called it the "Stompock,"—they said the attack generally lasted forty days, was never fatal, but highly infectious, and that convalescence was always tedious and slow. None of my Medical Subordinates knew anything about the

disease, nor had the Medical Officers to whom I mentioned it ever seen a case. I had never seen a case of it before either, and my curiosity being a good deal excited, I subjected all the patients attending daily at the Pettah Hospital (of whom there are a large number) to a close scrutiny, and shortly a man (a traveller) applied for admission as an in-patient, on account of "Fever and Rheumatism;" on examining his skin closely, it was found to be covered with an eruption of a *shade* darker than his skin, which might have been easily overlooked. His eyes were inflamed and he complained of a burning pain in them, and in short of all the symptoms related in the foregoing case, but in a mitigated degree; still the case might have been put down as *syphilitic* (though the man denied ever having had syphilis) until the skin *desquamated very freely*, which I considered was quite conclusive of its nature. I have never met with a case since, and I must conclude therefore that it is now not a common disease; otherwise in the large field of observation I have the advantage of, some cases must have occurred. The only other instance approaching to it I have *heard* of, is that of a European Missionary, who stated that some years ago, whilst stationed at a district of Mysore, far away from Medical aid, he suffered from a precisely similar train of symptoms, but did not know what was the nature of the disease.

Copland is the only author at my disposal, who gives any account of the disease, and his description agrees in all essential particulars with the symptoms observed in this case, excepting the duration of the eruption, which, in this instance, was much longer than is stated by him. This symptom, however, he says, is described differently by different authors. The disease, according to Copland, would appear first to have made its appearance in Rangoon and Bengal in 1824, where it was very severe. It next appeared in the West Indies in 1827, and travelled northwards through the Gulf of Mexico, New Orleans and Charleston, which town was very severely visited. A few cases appeared in New York and Philadelphia, but it did not extend further. In the Island of St. Thomas, it is stated that out of a population of 12,000, scarcely one escaped.

Tanner in his "Practice of Medicine," 4th edition, makes a passing allusion to the disease as prevailing in the East and America, and states that it is "peculiarly infectious."

No. 2.—*Jaundice; Distension of the Gall Bladder; Obstruction of the Cystic and Pancreatic Ducts; Disease of the Pancreas.* By Assistant-Surgeon W. H. Morgan, 23rd W. L. I.

A. M.———, aged 47, twenty-six years resident in India.

In August 1864, March and July 1866, the patient was under treatment for dysentery. Had jaundice in the latter end of July, and was transferred under this head on the 1st of August with yellowness of the conjunctivæ and of the skin generally; tongue at first tremulous, thickly coated at the base, red at tip and edges; stools generally figured and of a drab colour; urine of the colour of porter, showing the presence of biliary pigment when treated with nitric acid, quantity passed during twenty-four hours seldom below ℥xxv., frequently more. The liver dulness extended a little below the level of the ribs, and a tumour which could be grasped in the hand was repeatedly felt about three inches to the right of the umbilicus, when the patient was lying down. This was regarded as the fundus of the gall bladder. He could bear pressure over the right hypochondrium, but suffered occasionally from pain (the nature of which he could not describe) in the epigastric and umbilical regions. The escape of gall stones through the biliary ducts was suspected from the above symptom, but the most careful search for calculi in the excretions was fruitless; no pyrexia, no night sweats, no acceleration of pulse in the evenings, no irritability of stomach. On the 20th August the patient passed a quantity of tenacious mucus which, under the microscope, appeared to be made up of broken-down epithelium, granular corpuscles, &c.

On the evening of the 7th of September, the pulse was above 100, but observations made daily since then did not show it higher than 87 in the afternoon. During the month the patient lost flesh, the bowels moved once in twenty-four hours as a rule, the stool being figured and of a slate colour, urine as before described. Hiccough was present for some days in the month; relieved by the administration of sulphuric ether in cinnamon water.

Seeing no improvement in the case, and the patient's wish to serve a few months longer being overcome, the documents necessary for his removal to the depôt at Poonamallee were forwarded for counter-signature in the middle of October, and permission for his transfer published in orders on the 28th of that month, but two days previously he took to his bed, being unable to sit up. The emaciation progressed, and from this time he slept badly at night, his thoughts were wandering and he had dismal forebodings.

For the first four days in November the temperature of the axilla was higher than usual, ranging from 99°—105°F., subsequently both temperature and pulse were normal, the only exception to the former being on the 12th November, when it stood at 105°, and to the latter on the 8th of the month when the number of beats of the pulse are recorded as 100 per minute. From the 6th November the stools were passed in bed; they were of a dark colour and very offensive; pellets of fat were seen in them since the 8th, and on that night he had cold and copious sweats; the abdomen was considerably distended.

November 15th.—Blood mixed with a stool passed during the night, pellets of fat passed as before. Patient dozes day and night; is too weak to spit out the secretions collecting in his mouth.

20th.—Getting worse, features pinched, thoughts wandering, troubled with incessant hiccough since 11 A. M. yesterday, which the former remedies now fail to arrest.

21st.—A quantity of tarry-looking stuff has been passed by stool. I am unable, after a microscopic examination, to satisfy myself that this consists of broken-down blood corpuscles; treated with sulphuric acid and sugar, on the other hand, it did not yield the red or violet tinge of bile. On the 26th there was no improvement, the stomach was irritable, and the patient did not evince any inclination for nourishment. Three days after (on my return from other duty at Negapatam) the patient did not recognize me as usual, and I was informed by his attendants that there was great difficulty in keeping him in bed on the preceding night; his speech was embarrassed, respiration becoming difficult; towards evening the pupils were insensible to light, and he died at 12-30 on the 30th Nov.

Treatment.—The bowels, when confined, were acted on by purgatives such as Seidlitz powders; the sulphate and carbonate of magnesia with infusion of senna; podophyllin; Plummer's pill with aloes and soap; enemata of castor oil and turpentine. For the first three weeks in August the patient had taraxacum with dilute nitric acid and infusion of quassia; from the 22nd August to the 10th September he got a mixture of carbonate of soda, infusion of calumba, tincture of rhubarb, and nitrate of potash; from that date up to the 9th October, quinine first with tincture of the muriate of iron, and subsequently without it. From the 9th October he was given a mixture of acetate of potash, taraxacum, conium, &c., and latterly the preparations of ammonia, the decoction and tincture of bark. From time to time he had a variety of applications to the right hypochondrium, such as turpentine epithems; linseed meal poultices; the compound tincture and ointment of iodine; turpentine with ammonia liniment; nitro-muriatic acid, &c.; anodynes were given to relieve pain and to procure sleep. The diet was simple with a daily allowance of wine, and latterly brandy. Early in August the patient had a change of air to the coast, but as he was not comfortable in the quarters he had there he soon returned, and used to go out every evening for exercise in a bullock coach till he was too weak to do so.

Autopsy held 8 hours after death; Temperature 79° Ft., weather cloudy.

Head.—Not examined.

Chest.—Heart, large and flabby, some fluid in the pericardium. Lungs, both healthy and adherent to the parieties of the thorax by old adhesions.

Abdomen.—There is a large development of subcutaneous fat: about seven quarts of fluid in the peritoneal cavity of the color of a strong infusion of tea. Omenta loaded with fat. Liver of a dark bluish colour adhering in two or three places superiorly to the diaphragm, scarcely projecting below the margin of the ribs; capsule can be easily torn off, parenchyma friable and more or less congested, no abscesses. Gall bladder pear-shaped, projecting for some inches below the right lobe in the situation noted during life, and very much distended. On laying it open at its most dependent part ℥xiv. of bile escape, black in colour

and of the consistence of treacle. A probe passed into this organ *in situ* can find no outlet, but on removing it and laying it open throughout its length an opening just capable of admitting the point of a probe is discovered leading to the duct which a little beyond this is again impermeable. There are no gall stones in the bladder or duct. The duodenum is laid open and the openings of the pancreatic and common duct carefully searched for without success. The mucous membrane at the usual situation of these ducts and for some inches both above and below these is congested and of a redder colour than other portions of this bowel. The Pancreas is hypertrophied especially towards its head, its duct is distended with a light yellowish fluid, some of which escaped by an incautious incision, the duct admits the tip of the thumb at its widest part. The room in which the examination was conducted was dark, and it was not easy with the aid of a lighted candle to ascertain several other points which greater care and skill might have cleared up. Spleen healthy. Portions of the small and large intestines were laid open *in situ* and found free from ulceration. Kidneys somewhat large and congested. The other urinary organs were not examined; and through an oversight the stomach was not laid open.

Remarks.—That this was a case of jaundice from obstruction and not suppression, was supposed during life from the presence of the pear-shaped tumour to the right of the umbilicus, though occasionally doubts arose in my mind as to the contents of the tumour from reading cases recorded by Bright.* In the progress of the case the discharge of pellets of fat by stool being mentioned to Surgeon-Major Ranking (who as well as the Deputy Inspector-General of Hospitals, Southern Division, had kindly seen the patient) he drew my attention to the connection between it and diseased states of the pancreas, and which it will be remarked was verified at the post mortem examination. Kirkes† refers to numerous cases recorded in the Transactions‡ of the Royal Medico-Chirurgical Society in which the pancreatic duct being obstructed and the liver coincidently diseased, fatty or oily matter was abundantly

* See Bright's Clinical Memoirs on Abdominal Tumours (republished by the New Sydenham Soc.) Cases 13 and 14, pp. 277—79.

† Hand Book of Physiology, 5th Ed., p. 264.

‡ Vol. xviii. p. 57.

discharged from the intestines. The gall bladder is ordinarily capable of containing eight or ten fluid drachms*, and in this instance I found ℥xiv. of bile. Frerichs † in the cases that came under his observation did not find more than from ℥viii. to ℥xvi., though he says "the older physicians mention cases in which the quantity was more considerable," from seven to eight *quarts.*

No. 3.—*Case of Compound Fracture of the Cranium, Coma, Death.* By Lewis C. Nanney, Esq., Assistant-Surgeon, doing duty General Hospital, Madras.

Mungathoyamah, (female), aged 70 years.

4th December 1866.—Admitted into the General Hospital at 4-30 P.M., having just sustained injuries by being knocked down and kicked by a pony.

She had lost a considerable amount of blood and was suffering from the effects of shock. Surface of body quite cold, pulse scarcely perceptible. No hæmorrhage from either nose or ears. A semicircular lacerated wound, about two inches in length, existed over the frontal bone just above the right orbit. The bone was exposed and fractured. Another wound existed above and behind right ear, separating the upper attachment of the helix. A stellate fracture of the bone existed here, one ray running forwards to the external angular process, and another backwards beyond the limit of the external wound. There was also an oblique fracture of the lower end of right radius.

The wounds were dressed with wet compresses and bandage, some food and stimulus given, and the patient removed to the ward. In the evening some smart hæmorrhage occurred from the wounds necessitating the removal and re-adjustment of the dressings.

For the first day or two the patient continued apparently under the influence of shock. Some serous oozing occurred from the right ear, signs of compression came on, and she fell into a comatose state. There was no attempt at

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* Quain and Sharpey's Anatomy, 5th Ed., vol. ii. p. 1073.

† Clinical Treatise on Diseases of the Liver, (pub. by the New Syd. Soc.) Vol. i. p. 130.

rallying; she became weaker and weaker and died on the 12th December, eight days after the receipt of the injury.

Autopsy, 14 hours after death.

Body emaciated. Right radius fractured.

Head. The wounds above described were seen to exist without any attempt at reparation.

On removal of the scalp and right eyeball, a fracture was detected extending from about an inch to the right of the mesial line of upper border of frontal bone (the sutures were obliterated) forwards and obliquely downwards to near the external angular process, and then across the orbitar plate of the bone and the lesser wing of the sphenoid terminating in the sphenoidal fissure. The bones of the inner wall of the orbit were comminuted. A second fracture, enclosing an oval-shaped piece of bone about an inch in breadth and an inch and a half in length, commenced at the right temporo-maxillary articulation and extended through the squamous portion of the temporal bone. The right zygoma was fractured at its junction with the malar bone, at its middle, and again at its root, the fissure extending across the base into the petrous portion of the temporal bone. The roof of the left orbit was fissured and there was slight extravasation of blood there. There was also a fracture of the nasal process of left superior maxillary bone.

On opening the cranium the dura mater was found somewhat congested and the arachnoid and pia mater much more so; the vessels being engorged with blood. A large clot of extravasated blood was situated just beneath the seat of injury on the frontal bone, and was closely adherent to the dura mater. The anterior lobe of the brain at a point corresponding to this clot was tinted of a greenish hue. There were no signs of pus, and the cerebral substance was healthy.

All the other organs were healthy.

No. 4.—*Poisoning by Datura?* By Assistant Apothecary S. M. Tyrrell, General Hospital, Madras.

Govindoo, Maistry, Ordnance Department, aged 39 years.
Coollen, Armourer, Ordnance Department, aged 22 years.
Cutteeamah, mother-in-law of Govindoo, aged 45 years
Seetharam, aged 15 years. } sons of Govindoo.
Rajah, aged 7 years. }
Rungen, male, aged 35 years.

The first two persons were brought to the General Hospital, by Orderlies of the Ordnance Department, at 8-30 A.M. on the 1st November 1866. The four latter were brought about 2 P.M. of the same day, from Chintadrepettah, by Police Peon No. 32, who stated that they had all been poisoned.

History.—A neighbour of the above patients stated that on the previous evening a man and his wife who were lodging in Govindoo's house, gave "a treat" in commemoration of a festival. Rice cakes, curry and abundance of arrack and toddy were served out to the guests who were the above named six persons, and also the wife of Govindoo.

The Maistry and the man Rungen partook very freely of the spirits as well as of the curry and rice and cakes; Coollen, Cutteeamah and the two boys only ate the food; Coollen only partook of a small piece of cake and some curry. After the repast they all became insensible, when the "founders of the feast" decamped, first robbing the maistry of some cloths and his brass utensils.

Condition on admission.—*Govindoo* presented a wild and maniacal appearance. He was very restless, constantly moving to and fro in the ward, resisting the restraining efforts of the orderlies who were put over him, issuing peremptory commands to them, and addressing others by name who were present only in his imagination. He appeared to be busily engaged in his ordinary avocations. His pulse was steady and soft. Tongue stained with betel. Pupils slightly dilated but acting under the stimulus of light.

Coollen was very much less affected than the maistry. His skin was hot, face a little flushed, and pulse quick. No dilatation of the pupils observed. He stated that after having eaten a small quantity of rice-cake and curry he became unconscious of all around him and fell asleep. He awoke about 5 A. M. feeling drowsy and dull, and went to his work, not knowing that he had neglected to dress himself. On arrival at the Arsenal he was sent home to dress as he was in a state of almost complete nudity. He vomited twice and was then sent to Hospital.

Cutteeamah was in a state of great nervous excitement. She occasionally answered imaginary questions in a sudden, starting, ejaculatory manner. She could be made to fix her attention, but replied to direct questions as if frightened. Her pupils were slightly dilated. Pulse steady and soft.

Seetharam was very restless, and so alarmed that he attempted to run away when any one approached him. He had a wild, startled expression, and when questioned kept on muttering "Yes, sar; no sar; what sar." He evidently imagined himself at school and was constantly repeating his lessons in an incoherent manner. He was too frightened and unsteady for his pupils to be examined.

Rajah appeared very intoxicated and in a particularly happy mood. He was frolicsome, and, as he could neither stand nor walk steadily, he tumbled about the ward in a very droll manner. He kept repeating the Tamil alphabet. His pupils were not dilated.

Rungen was in a perfectly helpless state. His limbs were lax and powerless, and he could not stand without support. He was very tremulous and prostrate, and passed urine involuntarily. Every now and then he had a slight convulsive fit, the muscles of the extremities being thrown into clonic spasm. He talked incoherently. His pupils were widely dilated and insensible to light. The pulse was very excited.

Mr. Chipperfield ordered a mustard emetic to be administered to each of the patients. Free effect occurred in all; the ejected matters consisting principally of undigested rice, with some masses of meat and a quantity of greenish tinged vegetable matter. After free emesis had been induced, a dose of scammony and compound jalap powder was given to each patient, producing full purgation.

The next morning, the patients were quite well and were discharged from Hospital, with the exception of Rungen, who was detained until the following day.

The wife of the maistry, who had also partaken of the cake and curry, vomited freely soon after eating, but did not suffer from any of the symptoms which the others presented.

No clue could be obtained to the nature of the poisonous substance which had been administered. From the symptoms alone it is supposed that it was stramonium. A quart bottle was brought containing about an ounce of sour toddy with a small quantity of greyish powder. Under the microscope nothing more was seen than some torula, and some fibre and ducts of vegetable tissue. There was nothing which could lead to the detection of the nature of the seeds which had been used.

The word "poisoning" has been used in the heading of this article, but probably "intoxication" would be more strictly correct.

No. 5.—*Poisoning by Chloride of Zinc.* From the Medical Journal of the General Hospital, Madras. Case reported by Student B. T. Pritchard.

F. B., a Swede, a seaman, 17 years of age. Admitted on the 16th January 1867, complaining of pain in the epigastrium and abdomen, which is increased on palpation, coughing, and moving about. Pulse 76, rather small. Tongue coated with a brownish fur. States that he walked into the Captain's cabin yesterday afternoon and drank three quarters of a tumblerful of fluid which he thought was brandy, but as the taste was acrid he told the Chief Officer, who said it was Disinfecting Fluid, and immediately gave him an emetic, which was repeated as it did not act freely. Upon the Captain becoming acquainted with the circumstance he also administered an emetic, which acted very freely.

A note was at once dispatched to the Captain to enquire what was the nature and quantity of the fluid taken.
To have

Olei Ricini ℥i.
Tinct. Opii ♏x. directly.
Milk Diet. Mutton broth, 1 pint.

17*th.*—Bowels moved twice this morning. Still complains of pain in the stomach and bowels. No answer from the Captain at present.

18*th.*—Bowels not moved since yesterday. The pain is less. Tongue foul. Pulse very slow, soft and compressible. The Captain writes to say that the fluid drunk was Sir Wm. Burnett's Solution of Chloride of Zinc. Quantity and degree of dilution not known. The Chief Officer gave emetics of Ipecacuan, but as they did not act freely, the Captain gave 8 grs. of Tartar Emetic, and followed it by warm water until the fluid vomited was quite clear.

19*th.*—Still has pain in the epigastrium, increased upon taking food. Also has great soreness in the œsophagus, but no difficulty of swallowing, merely a sense of rawness on the passage of anything either solid or fluid. Pulse small, and soft. Tongue clean. Bowels open.

℞. Magnesiæ Carb. grs. xv.
Aquæ Menthæ ℥iss. Thrice daily.
No solid food; milk and broth.

20*th.*—About the same. Upon examining the throat the tonsils are found enlarged and injected, the fauces also are red. Tongue clean.

Continue.

22*nd.*—The soreness of the œsophagus is less, but there is still much pain in the epigastrium. Otherwise well.

Continue.

25*th.*—The pain is lessened. Omit medicine.

Allowed some bread and butter with his slops.

27*th.*—Was purged thrice yesterday and once last night. Had a few doses of Chalk mixture. Is now much better, and makes no complaint of pain or uneasiness. Says he is very hungry and begs for more food. Throat well. Tongue clean.

Chicken diet.

29*th.*—Quite well. No pain or diarrhœa. As his Ship is about to sail, he is discharged.

N. B.—It is unfortunate that no information could be obtained as to the probable amount of Chloride of Zinc this lad swallowed. It is presumed that the fluid must have undergone considerable dilution as there were no signs of corrosive action on the mucous membrane of the mouth.

No. 6—Cholera Pills.

Memorandum.

THE correspondence marginally noted relative to Native Surgeon Iyasawmy's prescription for Cholera Pills is forwarded to the Editor Madras Quarterly Journal for publication, the subject being one of considerable practical interest.

Proceedings of Government, Revenue Department, No. 3211, of 23rd November 1866.

Letter from Native Surgeon M. Iyasawmy, No. 57, dated 8th February 1867.

By order,
W. R. CORNISH, Surgeon,
Secretary, Principal Inspector General,
Medical Department.

Office of Prin. Insp. General, Medical Dept.
Fort Saint George, 23*rd February* 1867.

To the Editor Madras Quarterly Journal,

Proceedings of the Madras Government, Revenue Department, 13th November 1866.

Read the following Telegrams.

* * *

No. 290.—From Collector, Cuddapah, to Secretary to Government, Fort Saint George, Madras; dated 12th November 1866.

Season continues very encouraging. Crops are all in good condition, no rain this week. Pasturage most abundant. Public health, Cholera almost ceased. I continue to feed from 400 to 500 poor from private funds. The rest as before. A most valuable pill for cholera: Paterson's Pill without the opium, substituting chillies and cantharides. This is Iyasawmy, Native Surgeon's receipt. In this district it has had great success, hundreds have been cured by it. Prices increased on account of a great demand from Bangalore, but not materially.

* * *

No. 300.—*Order thereon, 13th November* 1866, *No.* 3083.

1. Ordered that the foregoing telegrams be recorded,

2. Referring to the telegram from Cuddapah, the Collector is requested to obtain and forward the Native Surgeon's prescription, mentioned by him as so successful.

(Signed) J. D. SIM,
Secretary to Government.

Proceedings of the Madras Government, Revenue Department, 23rd November 1866.

No. 573.—Read the following letter from the Collector of Cuddapah, to the Secretary to Government, Revenue Department, Fort St. George; dated Cuddapah, 19th November 1866, No. 42 :—

With reference to the order of Government, dated 13th November 1866, No. 3083, I have the honor to enclose prescription for the Cholera pills, prepared by the Native Surgeon, Iyasawmy, as therein directed.

Prescription for the Cholera Pills.

Plumbi Acetas.....	ounces 2	and	scruples	2
Calomelas.....	ounce 1	„	scruple	1
Camphor...	„ 1	„	„	1
Chilly powder... ...	„ 1	„	„	1
Pulv. Cantharides...	„ ½	„	„	½
„ Aromatic.....	ounces 4	„	scruples	4

Dissolve the Acetate of Lead and Cantharides in two drachms of Acetic acid, the Camphor in some Alcohol, when they are to be rubbed up with the Calomel, Chilly powder and Aromatic powder, with a sufficient quantity of distilled water, and divided into a thousand pills. One or two for a dose.

(Signed) M. IYASAWMY,
Native Surgeon.

Cuddapah, 16th Nov. 1866.

No. 574.—*Order thereon, 23rd November* 1866, *No.* 3211.

Miscellaneous.

Communicated to the Officiating Principal Inspector General, Medical Department, for his opinion.

(True extract.)

(Signed) J. GROSE,
Under-Secretary to Government.

Letter No. 57, from Native Surgeon of Cuddapah, to the Deputy Inspector General of Hospitals, Ceded Districts, dated Cuddapah 8th February 1867.

1. With reference to your official Memo, No. 634, dated the 5th instant, accompanying the letter from the Secretary of the Principal Inspector General, Medical Department, to your address, directing me to report as to the utility of the Cholera pills compounded by me, I beg to submit the following remarks thereon.

2. I have been in the habit of using the pills under consideration, for the past three years with much success, both in the Hospital and in my private practice; and when Cholera broke out in the Taluqs last year, I have, at the request of the Collector, issued out nearly 30,000 pills to the various Tahsildars, Police Inspectors and also to some of the Missionaries residing in the districts, for distribution. The reports received from these authorities speak highly of their utility—more than one-half of the cases treated by the pills are said to have been cured.

3. Under my personal observation during the last quarter of the past year, 12 well marked cases were treated in the Hospital with these pills; out of this number 9 recovered. Among the out-patients I attended upon 26 persons, of these 17 got well. The persons brought to the Civil Dispensary for treatment were all, with one or two exceptions, in the last stage of the disease; most of them were cold, pulseless, and with total suppression of the renal secretions; in 5 the cramps were very severe, and in others, this symptom was slight or had ceased before admission.

4. I found the pills to do good both in the incipient and advanced stages of the disease, and in persons of all ages. After administering 4 or 5 pills the kidneys generally begin to act, the clammy, cold perspiration gradually diminishes, and heat returns to the skin. I usually commence the treatment by giving a mustard emetic, and the pills are repeated every hour or after each loose motion. The vomiting is frequently checked by the administration of spirits of camphor (prepared by dissolving camphor in chloroform) 5 or 10 drops on a lump of sugar.

5. Owing to the absence of opium in their composition

these pills can safely be entrusted with any person of ordinary intelligence for administration or distribution.

6. I have abstained from the use of opium inasmuch as I found, after many years' experience, that it has an injurious effect, particularly in the advanced stage of the disease. In the premonitory stage however, the complaint might often be checked by a dose of Chlorodyne or Laudanum, combined with Sulphuric acid, or vegetable astringents. But I may be permitted to say that when the disease is once fully developed, I generally found the use of opium to be attended with danger, either by suddenly suppressing the alvine evacuations and thereby causing tympanitis; or by affecting the head and producing coma.

7. In conclusion,—with reference to that part of your official memo, calling for an explanation of the cause of the delay in submitting the report,—I respectfully beg to state that as the letter of the Secretary of the Principal Inspector General, dated 24th November last, reached me about the end of that month, and as the time for submitting the Annual Report of the Civil Dispensary was close at hand, I was under the impression that it would be sufficient to embody (as I did) in that report full particulars of my personal experience as to the efficacy of the Cholera pills prepared and used by me, without sending in a separate report. I regret to find, however, that I have been mistaken in supposing so, and beg that I might be excused for this remisness.

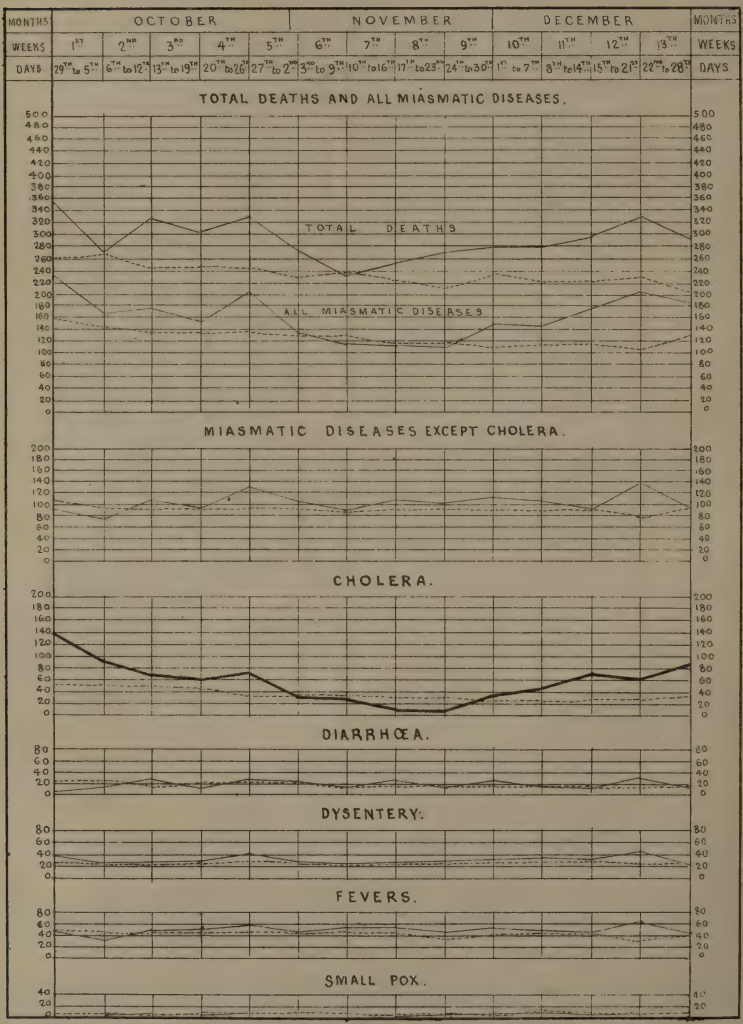
No. 7.—*Report on the Causes of Death in Madras, for the 4th Quarter* 1866. By the Hon'ble R. S. Ellis, C.B., Sanitary Commissioner.

The Fourth Quarter of the past year shows a total mortality in considerable excess over the corresponding quarter of previous years.

The number of deaths has amounted to 3,827, of which 2,079 were from Miasmatic diseases and 1,748 from other causes.

The accompanying diagram will show the wave line of mortality from all causes, and its variations are in general accord with those of deaths from all Miasmatic diseases.

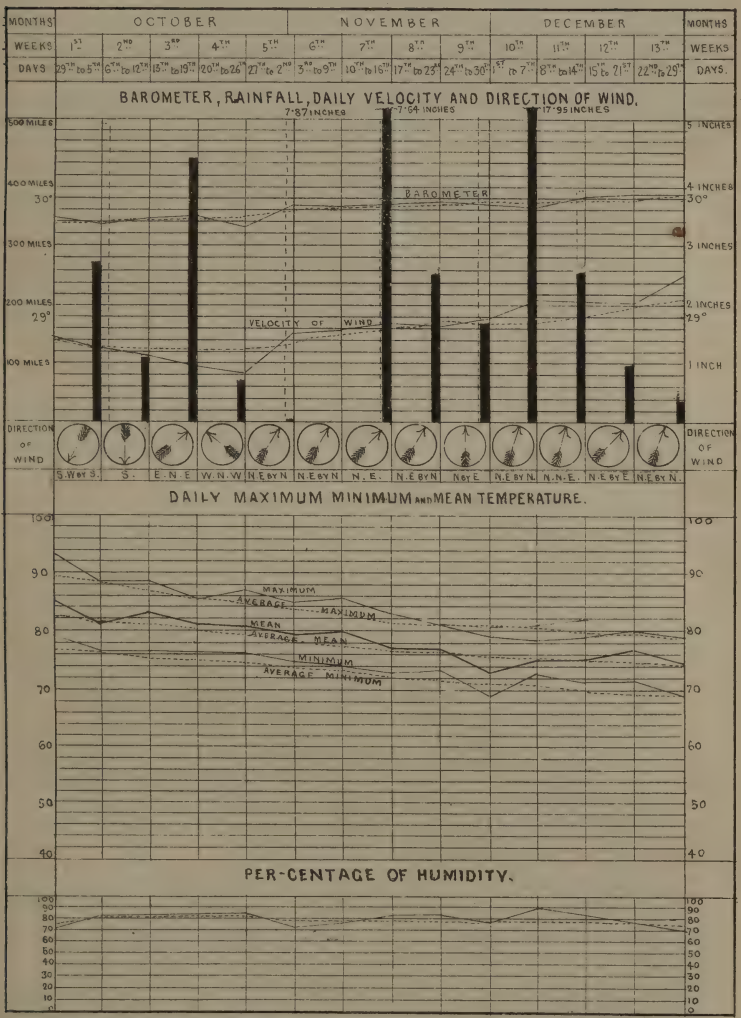
DIAGRAM SHOWING THE DEATHS IN MADRAS FROM ALL CAUSES, MIASMATIC AND SPECIAL MIASMATIC DISEASES DURING THE 4TH QUARTER 1866.


MONTHS
OCTOBER
NOVEMBER
DECEMBER
WEEKS
1ST 2ND 3RD 4TH 5TH 6TH 7TH 8TH 9TH 10TH 11TH 12TH 13TH
DAYS
29TH to 5TH 6TH to 12TH 13TH to 19TH 20TH to 26TH 27TH to 2ND 3RD to 9TH 10TH to 16TH 17TH to 23RD 24TH to 30TH 1ST to 7TH 8TH to 14TH 15TH to 21ST 22ND to 28TH
TOTAL DEATHS AND ALL MIASMATIC DISEASES.
TOTAL DEATHS
ALL MIASMATIC DISEASES
MIASMATIC DISEASES EXCEPT CHOLERA.
CHOLERA.
DIARRHŒA.
DYSENTERY.
FEVERS.
SMALL POX.

N.B. The total Mortality from each disease during each week is plotted on the perpendicular lines which represent these periods. The horizontal dotted wave lines show the average mortality from each disease for the previous 5 years.

Alex^r Barren. Lithog. Madras.

DIAGRAM SHOWING THE METEOROLOGICAL CONDITION OF MADRAS DURING THE 4TH QUARTER. 1866.



N.B. The mean weekly Meteorological elements are plotted on the perpendicular lines. The dotted wave lines show the bi-monthly averages for twenty years from observations kept at the Madras Observatory.

Alex. Barren. lithog. Madras.

The total number of deaths registered, 3,827, bears unfavourable comparison with the death-rate of the fourth quarter during the five previous years, which averaged 3,085, the maximum rate having been seen in 1862, and the minimum in 1864. There has therefore been an increase of mortality, as compared with similar periods in former years, of 742 deaths.

1861	3 303
1862	4 006
1863	2,629
1864	2 412
1865	3,077
Total...	15,427
Average...	3,085

Contrasted with the three preceding quarters of the year as regards mortality from the different classes of diseases, shown marginally, this quarter has been second in amount of mortality from all causes, from Cholera and from all Miasmatic diseases. In these latter two items it shows a considerable improvement upon the preceding quarter which is notoriously unhealthy in all years.

1866.	All Miasmatic Diseases.	Cholera.	All Causes.
1st Quarter...	1,521	321	2,960
2nd do ..	1,469	320	2.926
3rd do ...	2,667	1,655	4,168
4th do ...	2.079	688	3,827

Assuming the population to amount to 4,50,000, the death-rate of this quarter was at an annual rate of 34 per mille.

Among Europeans there were 54 deaths as against an average quarterly mortality of 36·5 during ten years from 1856 to 1865.

There has for the last three years been a steady increase in the rate of mortality of this class of the population. This is no doubt more apparent than real, and is due to an increase in the number of European inhabitants, but the actual mortality to strength cannot be duly estimated without a recent and reliable census. Indeed, this want renders all the calculations in the present Mortuary Reports of doubtful value.

Six cases of death from Cholera occurred among Europeans. One of these was a gentleman who was of advanced age, and another gentleman residing in the same house lost several of his servants from the disease which was prevalent in the immediate neighbourhood of their residence. I directed the attention of the Municipal Commission of Madras to this locality, which is on the great thoroughfare

of Madras, the Mount Road, and they immediately issued orders to have the place properly cleaned and rank vegetation removed. An immediate improvement was observed, and the disease quickly disappeared on the adoption of these measures.

Fever proved fatal to Europeans in six cases, Dysentery in five, and Diarrhœa in four instances; these three figures being almost identical with the experience of 1865 during the same quarter.

Attention was drawn in last Quarterly Report to the number of deaths among European children from July to September; in the present quarter the mortality among European children declined considerably.

Twenty-one deaths occurred among children of Civil and Military Europeans, and of the adult population who died, 22 were Civil and 11 Military, of the former nine were women. The deaths among Military occurred among males only.

Among East Indians, the death-rate has been extremely high, being about double that of the concluding quarters of 1864 and 1865, and 50 per cent. more than the average of the five preceding years. The actual number of deaths was 127, while the average mortality of the fourth quarters of ten years was only 65·6.

Twenty deaths were from Cholera, a number slightly in excess of the annual average of the last five years, but this latter is high in consequence of an unusual mortality from this disease in 1862, when 63 persons died of it. One fatal case of small pox occurred: this is the first witnessed during the fourth quarters of the past five years. Fevers, Dysentery and Diarrhœa also show a slight increase upon the experience of previous years.

The death-rate from non-miasmatic diseases were 67 as against a quinquennial quarterly average of 46·6.

Among Hindoos 3,042 deaths occurred, being considerably in excess (20 per cent.) of the quinquennial average, and 50 per cent. more than during the corresponding period in 1865. The death-rate from Cholera is high (530) as compared with the quinquennial average (391). But Diarrhœa, Dysentery and Fevers were not unusually fatal, although the distress of the lower orders during the period under

notice would have accounted for a large fatality from bowel complaints.

Among Mahomedans the total deaths (604) were much in excess of the quinquennial average 402, and of the fourth quarters of 1863-1865, when totals of only 324, 345 and 363 were recorded. The deaths from Cholera were 132, of whom 70 were females. The quinquennial average is only 54·8, and the increase in Fevers, Dysentery and Diarrhœa was considerable.

It is not improbable that among this portion of the community, the distress arising from the high price of all articles of food was more severely felt than among the Hindoo population. Their occupations are more restricted, and they are as a rule less industrious than the Hindoos.

The deaths from Fever were 662 in number. Those in the three preceding quarters were 541, 553 and 500. The fourth quarter is therefore the highest, and considerably above the quinquennial average which held good through the rest of the year.

Fevers.

1861	585
1862	569
1863	512
1864	493
1865	624
Total...	2,783
Average...	556·6

During the quarter the wave line of deaths from this cause was below the average only during the first two weeks, from which time it was always above, and in the twelfth week very considerably above it. The fourth and twelfth weeks were the most fatal, and the range of the disease ran between 40 and 60 deaths, with general evenness.

The total deaths from Small-pox were 12 which bears a favourable comparison with 35·4 which is the average of five preceding years.

The disease was entirely absent in the first, third, fifth, sixth seventh and twelfth weeks. The highest mortality was in the second week (3). During the other six weeks when the disease was fatal, the cases were equally two and one per week. During the previous quarters of the year, the deaths were consecutively 28, 34 and 29, so that in this respect the health of Madras was much improved.

Small-pox.

1861	126
1862	17
1863	19
1864	3
1865	12
Total...	177
Average...	35·4

The deaths from Dysentery are 409, being 90 above the quinquennial average. The numbers in the three preceding quarters were 337, 287 and 285. Except in the first week the range of mortality from this disease was above the average of the preceding years, and as shown in the diagram the progress of the disease and its relative intensity kept pace almost exactly with that of Fevers. Each of these classes reached their culminating points in the fourth and twelfth weeks, and each in the twelfth week showed the greatest excess over the average of previous fourth quarters. It ought however to be borne in mind that a good deal of rain had fallen, that the thermometer had reached its lowest point of maximum heat at the end of the tenth week, and of minimum heat a week earlier, and that the percentage of humidity had also reached its maximum during the quarter. These atmospheric conditions may be considered as influencing the public health, and in some measure accounting for the high mortality rate shown by this disease.

Dysentery.	
1861	361
1862	305
1863	300
1864	252
1865	375
Total...	1,593
Average...	318·6

283 deaths from Diarrhœa occurred during the fourth quarter, being only 16 in excess of those recorded in the first quarter of the year. In the second quarter 225, and in the third 172 were recorded. The death-rate was slightly in excess of that observed during corresponding quarters in previous years, and this excess is probably due to the atmospheric influences noticed under the head of Fevers and Dysentery. Diarrhœa was most fatal during the twelfth week, and generally the range and intensity of the disease was proportionate to, but lower than, Dysentery.

Diarrhœa.	
1861	253
1862	288
1863	236
1864	217
1865	286
Total...	280
Average...	256·0

As before shown Cholera bears a high proportion to the total deaths from all Miasmatic diseases, and during this quarter it has tended very considerably to increase this proportion. 688 cases occurred as against a quinquennial average of 466·0, and this latter number is much in advance of

Cholera.	
1861	614
1862	1,341
1863	133
1864	34
1865	208
Total...	2,330
Average...	466·0

that shown in 1864-65. During the first four weeks the rate was high (91, 70, 61, 71), in the next four weeks it rapidly declined, and for the next three rose slowly. A slight fall occurred in the twelfth week, and a rapid and considerable increase occurred in the concluding week of the quarter.

Of the several divisions of the town the 7th shows the highest total mortality, the 1st Division stands lowest, although embracing Black Town within its limits. The different localities in the Police Divisions were very unequally affected. Triplicane, Royapooram, Peddoo Naik's Pettah, and Cashemode—all suffered severely. One case of the disease occurred in Fort St. George in the quarters occupied by the Band. These quarters are ill-ventilated and close to the Fort Ditch.

The accompanying Chart will sufficiently explain the Meteorological condition of Madras during the past quarter.

Barometer. The Barometer showed an average mean atmospheric pressure of 29·926 reduced to 32°F., and the weekly registers show that the rise and fall differed slightly from those of previous years. In them an average pressure of 29·918 was observed. A slight fall occurred in the fourth week and a corresponding rise in the following one; the Barometer then followed the average line until the tenth week, when it slightly fell, and rising very slightly during the two weeks next following it became again almost identical with the average height.

Thermometer. The mean maximum temperature averaged above that of the previous 20 years, in which it was recorded. During the tenth and eleventh weeks (when heavy rain fell) the maximum temperature was *below* the average.

The mean temperature was ·7° above the 20 years average; in this respect being much closer to the average than in the previous quarter, when it was 2 degrees above the average.

The mean maximum temperature of the thirteen weeks noted was 83·0, and the mean minimum 73·3, the former being ·7 and the latter ·8 above the average.

Velocity and direction of the wind.

In this respect a much greater variation from previous results was shown. In the first four weeks a fall from 140 to 83 miles took place; in the fifth week a rapid rise occurred (from 83 to 157). During the following four weeks, the velocity of the wind continued high, and in the tenth week rose to 211 miles, slightly falling (to 200 miles) in the eleventh and twelfth weeks; it rose rapidly in the concluding week of the quarter when it reached its maximum of 250.

The direction of the wind was generally from N. and N. E. as was to be expected during the prevalence of the N. E. monsoon.

Humidity.

The percentage of humidity has been nearly identical with that of previous years. It has however at its maximum and minimum points shown an unusual range of difference amounting to 20. The dates of these maximum and minimum points correspond accurately with the tenth week, one of unusual rain, and the other with the fifth week in which usually rain falls, although no rain fell during this period in 1866.

Rain-fall.

The rain-fall amounted to 42·58 inches in the thirteen weeks as against an average of 31·06 from 1st March 1841 to 28th February 1861, and of 28·52 during a total of 58 years.

The increasing rate of mortality in Madras from Miasmatic disease, the intensity of which is due to the unfavourable sanitary condition of the town may, I trust, plead my excuse for urging upon the Government an early consideration of the project for a comprehensive scheme of drainage—which has been submitted to them by Captain Tulloch. Until the present and imperfect drains are replaced by a complete system of drainage, and until pure drinking water is available to the poorer classes, the Mortuary Returns will continue as at present to show an increasing death-rate. This high mortality, which falls in the first instance on the poorest classes, re-acts on all classes by the spread of epidemic diseases of which one, cholera, threatens to become endemic in Madras.

Table showing the mortality from Miasmatic Diseases in the last 13 weeks.

	Oct. 5	Oct. 12	Oct. 19	Oct. 26	Nov. 2	Nov. 9	Nov. 16	Nov. 23	Nov. 30	Dec. 7	Dec. 14	Dec. 21	Dec. 28	Total.
Fevers	34	51	52	60	47	54	55	48	54	50	44	61	44	654
Diarrhœa	19	23	15	27	25	17	21	18	22	19	16	31	19	272
Dysentery	25	27	29	40	31	21	25	30	31	34	32	44	28	397
Small Pox	...	3	...	1	...	...	...	1	2	2	1	2	...	12
Cholera	91	70	61	71	34	26	10	10	38	45	73	65	88	682
Other Miasmatic Diseases	...	2	...	2	1	...	2	3	2	1	2	1	8	24
Total	169	176	157	201	138	118	113	110	149	151	168	204	187	2,041

Average of the corresponding weeks for 5 previous years.

Fevers	41·0	42·6	41·2	45·0	41·6	42·4	41·0	39·8	40·0	45·2	42·4	36·6	42·6	541·4
Diarrhœa	24·0	19·8	20·0	22·2	26·0	17·8	18·2	19·4	16·0	15·8	18·4	17·2	19 0	250·8
Dysentery	26·0	25·4	23·4	26·2	24·6	22·8	22·8	24·6	26·0	24·4	25 4	21·2	21·2	314·0
Small Pox	2·8	1·8	3·0	1·4	2·2	3·0	3·6	3·0	1·6	3·0	2·4	2·4	5·4	35·6
Cholera	49·2	48·0	41·0	37·8	36·8	35·8	28·0	30·4	24·6	21·6	27·2	28·8	38·4	447·6
Other Miasmatic Diseases	2·4	1·6	3·0	2·0	2·0	3·8	2·2	2·6	3·0	3·8	4·0	1·6	1·0	33·0
Total	145·4	139·2	131·6	134·6	130·2	125·6	115·8	119·8	111·2	113·8	119·8	107·8	127·6	1622·4

Mean Meteorological Observations for the past 13 weeks.

	Oct. 5	Oct. 12	Oct. 19	Oct. 26	Nov. 2	Nov. 9	Nov. 16	Nov. 23	Nov. 30	Dec. 7	Dec. 14	Dec. 21	Dec. 28	Average.
Barometer reduced to 32° F.	29·771	29·834	29·866	29 770	29·921	29·925	29·950	29·983	29·958	29·913	30·016	30·073	30·062	29·926
Mean Maximum Temperature	88·5	88·3	85 6	86·8	85·0	85·9	82·4	81·3	79·1	78·3	78·9	80·0	79·0	83·0
Do. Minimum do.	76·6	76·5	76·4	76·0	74·2	74·0	73·1	73·3	68·8	72·1	71·7	71·8	69·4	73 3
Mean Temperature	81·8	82·5	80·7	80·2	79·6	80·0	77·5	77·4	73·8	74·9	74·8	76·2	74·4	77·9
Mean Humidity...	81	82	84	84	73	77	81	83	78	90	83	76	69	80 0
Prevailing Wind	S. W. by S.	S	E.N.E.	W· N. W	N. E. by N.	N. E. by N.	N. E.	N. E. by N.	N. by E.	N. E. by N.	N. N. E.	N. E. by E.	N. E. by N.	N. E. by N.
Mean Velocity in Miles ...	127	116	92	83	157	161	169	160	174	211	204	201	250	161·9
Rain fall...	2·71	1·02	4·42	0·62	0·08	...	7 64	2·55	1·74	17·95	2·59	0·89	0·37	3·54

Table showing the Mean Half Monthly Meterological condition of Madras for 20 years from 1st March 1841 to 28th February 1861.

	Half month ending 15th October.	Half month ending 31st October.	Half month ending 15th November.	Half month ending 30th November.	Half month ending 15th December.	Half month ending 31st December.	Average.
Barometer reduced to 32° F.....	29·822	29·873	29 914	29·950	29·957	29·996	29·918
Mean Maximum Temperature.....	86·5	84·2	82·3	81·1	80·1	79·5	82·3
Do. Minimum do.	75·9	74·3	73·1	71·7	70·8	69·5	72·5
Do. Temperature...	80·8	79.0	77·6	76·2	75·3	74·5	77·2
Do. Humidity...	81	82	77	78	79	76	78
Prevailing Wind....	S. by E.	N. E.	N. N. E.	N. N. E.	N. N. E.	N. N. E.	N. N. E.
Mean Velocity in Miles*..... ...	120	126	145	175	171	189	154·3
Rain fall...	5·08	7·87	6·28	5·52	3·98	2·33	5·17
Do. 58 years ½ monthly average.	4·66	7 23	5·77	5·07	3·65	2·14	4·75

* Average of 6 years only (1861 to 1866.)

Deaths in Madras, Fourth Quarter of 1866.

	European.		East Indian.		Hindoos.		Mahomedans.		Total.		General.
	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	Total.
Miasmatic Diseases.											
Small-Pox	...	...	...	1	5	5	...	1	5	7	12
Fevers	5	1	6	12	284	280	31	43	326	336	662
Dysentery	4	2	5	3	177	160	24	34	210	199	409
Diarrhœa	3	1	8	4	113	122	11	21	135	48	283
Cholera	4	2	11	9	266	264	60	72	341	347	688
Other Miasmatic diseases ...	2	1	1	...	9	8	4	...	16	9	25
Total Miasmatic...	18	7	31	29	854	839	130	171	1,033	1,046	2,079
Total of all other diseases...	17	12	37	30	774	575	161	142	989	759	1,748
Total...	35	19	68	59	1,628	1,414	291	313	2,022	1,805	3,827
——	54		127		3,042		604		3,827		
Mean Mortality of ten fourth quarters from 1856 to 1865.											
Miasmatic diseases	10·3	3·0	14·2	13·3	605·5	569·7	78·6	84·7	708·6	670·7	1379·3
Other diseases	16·7	6·5	20·2	17·9	577·1	476·1	97·0	97·3	711·0	597·8	1308·8
Total...	27·0	9·5	34·4	31·2	1182·6	1045·8	175·6	182·0	1419·6	1268·5	2688·1
	36.5		65·6		2228·4		357·6		2688.0		
Increase	17·5		61·4		813·6		246·4		...		1138·9
Decrease	..		...		...		...		...		...

METEOROLOGICAL RESULTS *from the Madras Observatory Register, for the month of October* 1866.

October 1866.	Barometer reduced to 32°.	Standard Thermometers. Observed extremes. Maxim.	Observed extremes. Minim.	Daily means. Dry.	Daily means. Wet.	Percentage of Humidity.	Wind. Prevailing direction.	Wind. Daily velocity.	Depth of Rain.	General Remarks.
	Inches	°	°	°	°	per cent.		Mls.	Ins.	
1	29·686	86·6	72·8	80·3	75·1	79	W.by S.	155	1·03	Rain from 1½ to 5¾ A. M. Day, chiefly overcast. Shower at 10½
2	29·713	89·0	77·1	82·8	77·7	80	S.	180	.....	Cloudy and hazy. [P. M.
3	29·817	88·2	76·3	82·1	77·9	83	S. S. E.	126	0·61	Rain from 1½ to 4 A. M. Day, chiefly overcast. Shower at midnight.
4	29·853	80·6	75·7	78·0	75·8	90	W.N.W.	49	0·92	Rain from 2¾ A. M. to 3 P.M.
5	29·829	86·0	75·8	79·6	76·6	87	S. by W.	70	.....	Cloudy.
6	29·827	87·2	76·5	82·4	78·3	84	S. S. W.	84	0·29	Passing clouds. Rain at 11 P.M.
7	29·822	89·1	72·8	80·7	78·2	90	S. S. W.	140	0·71	Heavy thunder storm at 3 A. M. Rain until 5 A.M. Passing clds.
8	29·845	88·4	77·3	82·1	77·5	82	S. by E.	133	0.02	Chiefly fine. Shower at 1¼ P. M.
9	29·861	89·2	78·0	82·5	78·2	83	S. by E.	126	.....	Passing clouds.
10	29·801	89·1	77·0	83·4	77·8	78	S. by E.	130	.....	Fine day; cloudy night.
11	29·813	87·1	75·1	82·9	77·5	79	S by W	106	.....	Chiefly fine.
12	29·868	87·8	78·1	83·6	77·8	78	S. E.	91	.....	Fine, with passing clouds.
13	29·887	87·7	77·4	82·2	77·2	80	E.	67	.....	Chiefly overcast.
14	29·866	85·6	75·9	81·2	77·3	84	E.	80	1·66	Light rain from 3¾ to 7½ A. M. Fine day.
15	29·835	85·6	77·0	81·1	77·6	86	S.E by E.	77	0·95	Fine sky with heavy passing clds Rain at 10½ A.M. and 10 to 12 PM
16	29·842	86·7	77·2	81·2	76·6	82	E. by S.	96	0·24	Passing clouds and showers.
17	29·862	86·0	76·5	81·0	77·3	85	N.E.by N	109	0·81	Chiefly cloudy. Rain at 5½ A. M. and 11¾ P. M.
18	29·893	82·9	75·2	79·9	76·2	85	N. by W.	99	0·76	Rain till 4 A. M. Chiefly overcast
19	29·877	84·8	75·8	78·0	75·4	89	N. by E.	114	.....	Chiefly overcast.
20	29·866	80·4	75·5	77·3	74·9	89	N. N. W.	69	0·06	Light showers. Overcast.
21	29·796	86·7	75·8	80·1	77·1	88	NWbyN.	65	.....	Overcast.
22	29·732	87·8	76·6	80·7	75·7	80	N· byW.	80	0·03	Chiefly overcast.
23	29·677	87·5	74·2	79·7	76·7	87	SW byS.	92	0·47	Rain till 1½ A.M. Chiefly overcast. Showers again at evening.
24	29·689	86·6	76·3	80·7	75·7	80	NWbyW	98	.....	Chiefly cloudy.
25	29·754	90·1	76·1	82·3	76·9	79	N.	89	.....	Passing clouds.
26	29·876	88·4	77·2	80·4	75·9	82	S. E.	89	0·06	Fine with passing clouds. Shower at 5 P. M.
27	29·917	87·9	75·7	80·7	74·5	75	E. by S.	70	.....	Chiefly fine.
28	29·929	93·9	74·6	80·8	75·3	78	N.EbyN.	166	.....	Chiefly fine.
29	29·926	84·6	76·5	80·1	73·8	75	N.EbyN.	189	0·08	Showery morning. Passing clds.
30	29·928	84·9	76·1	80·8	72·9	69	N.EbyN.	186	.....	Passing clouds
31	29·910	84·5	73·2	78·7	71·3	70	N. N. E.	136	.....	Fine, with passing clouds.

The Standard Barometer and Thermometers are read at 10 A. M., 4 P. M. and 10 P. M. and the Daily Means are obtained by the application of hourly corrections, deduced from twenty years' observations. The Cistern of the Barometer is 27 feet above the level of the Sea, and the Receiver of the Rain-gauge is three feet from the ground. The Wind and Rain registered are for the current civil day—from midnight to midnight.

N. R. FOGSON, *Government Astronomer.*

METEOROLOGICAL RESULTS *from the Madras Observatory Register, for the month of November*, 1866.

November 1866.	Barometer reduced to 32°.	Standard Thermometers. Observed extremes. Maxim.	Observed extremes. Minim.	Daily means. Dry.	Daily means. Wet.	Percentage of Humidity.	Wind. Prevailing direction.	Wind. Daily velocity.	Depth of Rain.	General Remarks.
	Inches.	°	°	°	°	per cent.		Mls.	Ins.	
1	29·912	84·7	71·9	77·9	70·1	69	N. N. E.	168	.....	Fine, with passing clouds.
2	29·626	94·4	71·7	78·2	72·0	73	N. by E.	181	.....	Cloudy.
3	29·948	84·7	72·7	77·5	71·3	74	N.E by N.	149	.....	Passing clouds.
4	29·972	85·7	71·7	79·6	75·4	82	N.E. by N.	154	.....	Fine, with passing clouds.
5	29·952	86·1	75·8	80·5	75·5	80	N. N. E.	162	.....	Passing clouds.
6	29·918	85·5	75·7	80·5	74·5	76	N.E. by N.	161	.....	Passing clouds. Fine night.
7	29·903	86·8	75·1	80·8	75·3	78	N.E by N.	165	.....	Passing clouds. Fine night.
8	29·889	86·2	75·0	80·5	74·0	74	N E by N	174	.....	Fine.
9	29·895	86·1	72·2	80·3	73·7	74	N.E. by N.	164	.....	Fine. [night.
10	29·896	84·5	72·8	79·7	73·4	75	N. E.	137	.....	Fine day : passing clouds at
11	29·913	83·5	73·4	75·2	72·0	86	N. E.	88	0·53	Rain about 10 A. M. Chiefly cloudy.
12	29·963	84·0	73·3	79·7	72·9	73	N.E. by E.	130	.....	Fine, with passing clouds.
13	29·974	84·3	72·8	79·7	73·0	73	N.E by N.	205	.....	Passing clouds.
14	29·935	84·7	73·5	79·0	71·7	71	N. N. E	229	.....	Passing clouds.
15	29·939	81·5	73·6	75·6	74·3	94	N.E by N.	215	2·80	Overcast. Rain from 2¾ to 3½ A.M. ; light ditto from 8 A.M. to noon : heavy ditto after 7½ P.M.
16	29·030	74·6	72·5	73·3	71·9	93	N.E by E.	178	4·31	Overcast & rainy nearly all day.
17	29·024	80·0	72·8	78·0	73·6	81	N. N. E.	186	0·19	Overcast. Rain about noon.
18	29·989	82·1	72·7	77·6	73·9	84	N. by E.	164	.....	Passing clouds.
19	29·990	83·0	73·5	77·6	74·4	86	N. N. E.	133	0·05	Showers before 6 A. M. Passing Clouds.
20	29·989	82·4	73·7	77·6	73·6	83	N.E. by N.	152	0·46	Rain at 5 A. M. and 10 P. M. Passing clouds.
21	29·975	80·0	73·8	77·6	73·5	83	N. N. E.	130	1·29	Chiefly cloudy. Rain from 11½ A. M. to 1 P. M.
22	29·968	80·4	73·0	76·3	72·4	83	N.E. by N.	172	.....	Passing clouds.
23	29·945	81·2	73·6	77·0	72·2	80	N.E. by E.	186	0·56	Chiefly overcast. Rain after 10 A. M.
24	29·967	76·2	71·5	72·4	70·9	93	N. by E.	144	1·58	Steady rain nearly all day.
25	29·991	77·7	71·0	74·3	70·2	83	N. by E.	155	0·16	Light rain until sunrise. Overcast.
26	29·951	80·4	66·5	72·7	65·0	67	N. N. E.	157	.....	Fine.
27	29·934	79·9	63·1	71·5	64·0	67	N. by E.	123	.....	Chiefly fine.
28	29·946	79·8	66·4	73·5	67·4	74	N. N. E.	199	.....	Fine, with passing clouds.
29	29·965	79·9	70·8	74·8	69·6	77	N.	228	.....	Overcast.
30	29·949	80·0	72·0	77·2	73·0	82	N. by E.	215	.....	Chiefly overcast.

The Standard Barometer and Thermometers are read at 10 A.M., 4 P.M. and 10 P.M., and the Daily Means are obtained by the application of hourly corrections, deduced from twenty years' observations. The Cistern of the Barometer is 27 feet above the level of the Sea, and the Receiver of the Rain-gauge is three feet from the ground. The Wind and Rain registered are for the current civil day—from midnight to midnight.

N. R. POGSON, *Government Astronomer.*

Meteorological Results *from the Madras Observatory Register, for the month of December,* 1866.

December 1866.	Barometer reduced to 32°.	Standard Thermometers. Observed extremes. Maxim.	Observed extremes. Minim.	Daily means. Dry.	Daily means. Wet.	Percentage of Humidity.	Wind. Prevailing direction.	Wind. Daily velocity.	Depth of Rain.	General Remarks.
	Inches.	°	°	°	°			Mls.	Ins.	
1	29·940	80·6	73·5	75·6	69·8	76	N. N. E	292	0·14	[P.M. Overcast. Showers after 5
2	29·903	72·4	68·3	70·0	68·7	94	N. N. W	244	2·16	Overcast with frequent rain.
3	29·889	76·3	70·4	73·9	73·3	98	N. N. E.	274	4·97	Steady rain nearly all day.
4	29·881	80·3	73·8	76·0	74·2	92	N.E.byE.	256	2·13	Light rain before noon. Heavy from 5 to 7 P.M.
5	29·925	75·9	73·0	75·1	73·5	93	N.E.byE.	153	7.99	Very heavy rain before 5 A.M. Day overcast.
6	29·890	81·4	72·7	76·5	74·7	92	N. E.	123	0.33	Showers before 7 A. M. Chiefly cloudy.
7	29·964	81·4	72·8	77·0	74·3	88	E. by N.	125	0.23	Showers before 6 A.M. and at 5-30 P.M. Passing clouds.
8	30·004	80·9	73·1	77·3	72·9	81	N.E.byN	232	1·46	Rain until 4 A.M. Passing clouds
9	30·022	78·9	72·5	75·0	67·3	68	N.E.byN	225	.....	Fine, with passing clouds.
10	30·044	77·4	69·0	74·1	68·9	77	N.	227	.....	Passing clouds.
11	30·048	77·8	69·6	73·4	71·0	89	N.	240	0·20	Cloudy. Rain after 9 P.M.
12	30·022	80·3	72·8	74·1	73·2	95	N. N. E.	171	0.21	Light showers before 11 A.M.
13	29·990	77·3	73·4	74·5	71·6	87	N. N. E.	166	0·39	Overcast. Rain from 6 to 8 A.M.
14	29·985	89·0	71·6	75·2	70·6	81	N. by E.	164	0.33	Rain from 6 to 9 A.M. Overcast.
15	30·034	80·6	74·0	77·4	71·3	75	N.E.byN	191	.....	Cloudy.
16	30·081	80·3	73·1	77·1	70·7	73	N.E.byN	212	.....	Chiefly overcast.
17	30·084	80·2	71·9	75·0	69·2	75	N.E.byE.	209	.....	Fine, with passing clouds.
18	30·082	80·1	69·2	75·4	69·6	76	E. N. E.	121	.....	Chiefly fine.
19	30·078	79·5	68·1	75·2	70·1	78	N.E.byE.	153	0·05	Passing clouds. Shower at 8 A.M.
20	30·073	81·0	73·6	76·9	71·8	70	N. E.	252	0·27	Showers before 9 A. M. Passing clouds.
21	30·082	78·5	72·8	76·0	70·4	77	E. by N.	266	0·57	Rain before 1 P.M. Overcast.
22	30·088	79·7	72·5	75·4	68·0	69	N. E.	276	.....	Passing clouds.
23	30·085	79·6	67·1	75·0	68·0	71	N E. byN	222	.....	Passing clouds.
24	30·096	79·8	70·2	75·5	68.3	70	N. E.	338	0·29	Showers between 2 and 4 A. M. Passing clouds
25	30·089	79·3	71·4	75·4	66·5	63	N. E.	308	0·08	Showers between 1½ and 4 A. M. Passing Clouds.
26	30·061	78·5	69·7	74·6	66·9	68	N. N. E.	239	.....	Chiefly fine.
27	30·013	77·7	67·3	72·6	65·3	69	N. by E.	204	.....	Chiefly fine.
28	30·001	78·4	67·3	72·5	66·0	72	N. by E.	165	.....	Fine.
29	29·978	80·2	67·7	72·9	68·9	82	N. N. E.	168	.....	Passing clouds.
30	29·934	79·3	71·8	75·4	69·8	77	N. E.	148	.....	Chiefly overcast.
31	29·960	80·7	68·5	75·0	70·1	79	N.E.byE	164	.....	Fine, with passing clouds.

The Standard Barometer and Thermometers are read at 10 A. M., 4 P. M. and 10 P. M., and the Daily Means are obtained by the application of hourly corrections, deduced from twenty years' observations. The Cistern of the Barometer is 27 feet above the level of the Sea, and the Receiver of the Rain-gauge is three feet from the ground. The Wind and Rain registered are for the current civil day—from midnight to midnight.

N. R. POGSON, *Government Astronomer.*

PART IV.

MEDICAL INTELLIGENCE.

Annual Report of the Madras Medical College, 1865-66.

1. The Session.

THE academical year of 1865-66 terminates to-day. It commenced on the 2nd of October 1865, and has consisted of a Winter Session of six and a Summer Session of three months' duration. The Winter Session terminated on the 29th of March, and the Summer Session commenced on the 3rd of April 1866.

2. College Staff.

Important changes have taken place in the College Staff since the date of last report (31st May 1865). Dr. Montgomery's connection with the College as Professor of Botany, &c., ceased on the 31st of July last. He had held his Professorship for 8 years, and was an able, zealous, and successful teacher. Dr. Bidie, his successor, assumed charge of his duties on the 25th September 1865. Mr. Blacklock left Madras on the 29th of August last, on sick certificate, and Mr. Chipperfield was appointed to act in his room as Professor of Medicine and Clinical Medicine. Dr. Aitken, Professor of Midwifery, &c., embarked for England on the 29th of August, having obtained furlough on sick certificate. His departure occasioned a permanent vacancy in the College Staff, which was filled up by the appointment of Dr. Harris, who assumed charge of his duties on the 29th of September 1865. Dr. Aitken, though connected with the College but one Session, had proved himself to be a practical and efficient teacher. Mr. Furnell, the acting Professor of Anatomy and Physiology, relieved Assistant Surgeon Æ. M. Ross on the 3rd of October last. Mr. Ross officiated in the appointment from the 25th of August to the 3rd of October 1865. These changes in the constitution of the College Staff

taking place, as they did, close upon the commencement of the present academic year, caused no little anxiety to the educational authorities. To lose, suddenly, experienced teachers of such subjects as medicine, midwifery, materia medica, anatomy and physiology, would have proved, at any time, a severe trial to the College, but to lose them just when new and untried changes had been effected in the arrangement of the Instition, was equivalent to placing the working of the College to signal disadvantage. The danger of the situation, however, has been tided over satisfactorily by the zeal and energy of all connected with the Institution. No changes have taken place among the Assistants since last report, except that the services of Mr. Watkins, the English teacher, have been dispensed with, in consequence of the alterations effected in the College arrangements under the order of Government, dated 29th March 1865.

3. Additional Courses.

In order to meet the requirements of the Madras University regulations, for candidates for degrees in medicine, &c., a course of lectures on Hygiene was delivered by Dr. Urquhart during the Winter Session, and a course of lectures on Comparative Anatomy by Mr. Chipperfield during the Summer Session.

4. Changes in the several curricula.

At the commencement of the academic year, considerable changes took place in the curricula of the three departments of which this Institution is composed, in consequence of the order of Government No. 84, dated 29th March 1865. The curriculum of the Senior Department was re-modelled to correspond with the requirements of the University, and the curricula of the Second and Junior Departments were re-cast to meet the sanctioned recommendations of a Committee, whose report on the working of the Medical College is dated 2nd December 1864.

5. Lectures, Examinations, &c.

The following table exhibiting the number of lectures delivered, the number of examinations held, and the proportion of examinations to lectures in each course during the past Winter and Summer Sessions, has been drawn up from the annual reports of the several Professors. As these reports are entered in full in the appendix, it will only be necessary to notice, in this place, any special

points which may have been touched upon by the several Professors.

Session.	Subject of Course.	No. of Meetings.	Number of Lectures delivered.	No. of Examinations held.	Proportion of Examinations to total number of Meetings.
Winter....	Medicine.	118	76	42	1 in $2\frac{17}{21}$
	Surgery	118	82	36	1 in $3\frac{5}{18}$
	Ophthalmology..	48	32	16	1 in 3
	Midwifery	112	65	47	1 in $2\frac{18}{47}$
	Chemistry.	120	76	44	1 in $2\frac{8}{11}$
	Medical Jurisprudence.....	70	47	23	1 in $3\frac{1}{23}$
	Hygiene..	42	27	15	1 in $2\frac{4}{5}$
	Physiology	115	79	36	1 in $3\frac{7}{36}$
	Materia Medica	120	66	54	1 in $2\frac{6}{27}$
Winter & Summer.	Anatomy..	172	110	62	1 in $2\frac{24}{31}$
Summer..	Botany	41	35	6	1 in $6\frac{5}{6}$
	Diseases of Women and Children.....	68	52	16	1 in $4\frac{1}{4}$
	Organic Chemistry	29	22	7	1 in $4\frac{1}{7}$
	Comparative Anatomy.....	44	30	14	1 in $3\frac{1}{7}$

Dr. Paul observes, "one great defect pervades this Department, Senior as well as Junior, (1st and 2nd Class 2nd Department students) the very imperfect knowledge of English possessed by its members and the untrained state of their minds. They have been all taken too soon from school, they are now being taught a difficult science at a time when they should be studying the rudiments of education, and, more especially the channel by which they alone can acquire knowledge, the practical use of the English language; many of them have a difficulty of comprehending what is said to them in lectures, or what is written in their text books, and still more in expressing their own thoughts orally or in writing."

One great difficulty in the way of these students comprehending readily the lectures delivered, depends upon the necessary use by the teachers of technical and scientific terms. The lads in College of the Second and Junior Departments, having had no preliminary hospital training, have missed the advantages secured to their successors of a two years' familiarity with the technical language of the Hospital and Dispensary. The standard of English demanded of candidates for the Second Department has recently been determined by Government, it is very necessary that standard should not be lowered.

Dr. Paul again remarks,—

"Considerable inconvenience was felt in the Clinical Class from the frequent absence of the members attending the dissecting and dispensing rooms. From the limited number of students it frequently happened that the students in charge of the new cases were absent on one or other of these duties, and consequently the cases could not be read, and the proper business of the morning, as it were, deferred till the morrow." In his report on the courses of Operative and Minor Surgery, Dr. Paul repeats his remarks.

The inconvenience complained of by Professor Paul undoubtedly exists, but it can be remedied only to a very slight extent. The only hours of the day which can be set aside for Practical Anatomy are the morning hours from 6 to 10 A. M. Every other arrangement which involves the prosecution of that most essential study during the College hours, namely, from 10 A. M. to 4 P. M., has signally failed. It is therefore a necessity that students detailed for Practical Anatomy should, for the time being, be excused attendance at Hospital. Practical Anatomy, however, is confined to the Winter Session, whilst Clinical teaching is continued throughout both Winter and Summer Sessions, and the average number of mornings, during which a student will be absent from his clinical course, in consequence of attendance at the dissecting room, will not exceed twenty in the whole period of 9 months.

Again, with reference to the absence, once in seven days, of students from their Clinical studies, to gain practical experience in the compounding and dispensing of medicines, it seems impossible to remove, in any great measure, this inconvenience, consistently with maintaining intact the

great principle which may be succinctly expressed thus; *Practical experience in a Hospital Dispensary is the necessary complement of courses of Practical Pharmacy attended in College.* The latter can never act as a substitute for the former.

Dr. Harris, the Professor of Midwifery, states that "Practical instruction in Midwifery at the bedside has been afforded to all the students in rotation at the Lying-in Hospital," but with reference to the subject of affording Clinical instruction in the Diseases of Women, he observes, "I do not think it is possible to establish a regular Clinical Class at the Dispensary of the Lying-in Hospital at present." This is a point which must be left to the judgment and discretion of the teacher. At the fitting time, Dr. Harris will no doubt add Clinical instruction in the Diseases of Women to the other great educational advantages of his admirable Institution.

Dr. Wyndowe referring to the subject of text-books, remarks:—"There is always difficulty (a pecuniary one) amongst the students in obtaining the sanctioned text-books. As the Committee in its report recommended a more rudimentary course of instruction for the Chemistry Class, I would suggest, in accordance with their proposal, that for the Second Department students, the small Manual of Chemistry in Chambers' Educational course, price in Madras rupees two and annas twelve, be substituted for the present College text-book by Fownes, price rupees nine and annas four." Dr. Wyndowe's recommendation might well be extended in principle to all the classes in College. The standard text-book might be restricted advantageously to students of the Senior Department, whilst a cheaper epitome of the subject should, if possible, be selected for students of the Second Department. The present College text-books are expensive, and few lads of the Second Department can afford to buy the most recent editions of them. The whole question of text-books is, at present, in an unsatisfactory state. In the annual report of the class of Practical Chemistry, Professor Wyndowe remarks:—"Considerable inconvenience also was felt from the want of a supply of chemicals, apparatus, &c., my indent for which, though forwarded in August 1864, not having yet been complied with." It is needless to say that delays of this kind cause considerable embarrassment to departments concerned.

Mr. Bidie, in his annual report of the class of Materia Medica, makes a suggestion with reference to the "Manual of Materia Medica" by Dr. Montgomery, which well deserves consideration and adoption. This excellent little "Manual" is practically rendered useless as a text-book by the publication of the new British Pharmacopœia. Mr. Bidie proposes to prepare a "Manual" on the plan of that compiled by Dr. Montgomery, which shall contain the various changes sanctioned by the new Pharmacopœia. It might be well perhaps to postpone the publication of the proposed Manual until the appearance of the second edition of the British Pharmacopœia and of the new Pharmacopœia for India under preparation by Dr. Waring.

Syllabuses.

*1. Surgery.
2. Medicine.
3. Physiology.
4. Chemistry.
5. Ophthalmology.
6. Midwifery.
7. Materia Medica.

6. Syllabuses of the course of lectures have been prepared by the several Professors, and those marginally noted have been passed through the Press. These syllabuses are of great value to the students; some of them, indeed, should rather be called *epitomes* of the sciences of which they treat.

Constitution of the Departments and Classes at the commencement and close of the academic year, &c.

7. *Senior Department.* At the commencement of Session 1865-66, the Senior Department consisted of—

2 Government students in their 5th year of study,
2 do do do 4th do
2 (1 Govt. and 1 Lane scholar) 3rd do
2 Private students do 1st do

making a total of eight students.

Government students Chinapoo and Seethambaram Pillai, having passed their final examination successfully, will receive on this occasion the diploma of Graduate in Medicine and Surgery of the College.

Gnanamootoo Pillai, a student in his fourth year, who, consequent on the recommendation made in last report, had his stipend suspended by the Director of Public Instruction, was finally struck off the roll of the Senior Department on the 29th November 1865, on the ground of prolonged and unexplained absence from his Hospital and College duties.

One private student, Mathew John, supported by the Travancore Government, joined the College at the commencement of the Session. He has however been permitted, at

his own request, to withdraw, in order that he may prepare himself for passing the First Examination in Arts of the University, before commencing his medical studies.

There remain four students on the roll of the Senior Department.

The Final Examination Committee report as follows on Government students Chinapoo and Seethambaram Pillai :—

"Seethambaram Pillai came short of rejection by only *four* marks and Chinapoo by *thirteen.*" The same students are spoken of as being inferior to those of the same department in former years, and as having attained to but "a poor mediocrity" in their professional education. These remarks of the Final Examination Committee are justified if we regard solely the results of the late examination. On that occasion, however, the young men were singularly nervous and confused, and seemed unable to command themselves sufficiently to give moderately ready answers on points with which they are quite familiar. Presence of mind is one thing, the possession of information another. Happy is the student who has both ; critical is his position, if having the latter, he yet lacks the former. During his curriculum, Chinapoo has had the first place in fourteen out of nineteen classes, and in the remaining five, he occupied the second place. In five of his classes, Seethambaram gained the highest position, and in fourteen the second.

These young men leave the College with the best wishes of their teachers for their success in life. If irreproachable conduct, high principles, zeal and diligence avail aught to secure success in life, then,—with God's blessing, their success may be regarded sure. The prospect of Government employment has been held out to them from the beginning of their career, and it is much to be desiderated that the sphere selected for them should be one of active professional exertion.

Pursooramen Naick, a student in his 4th year, whose stipend of Rs. 20 per mensem was suspended for one year in consequence of the unsatisfactory progress made by him in his studies, has so far secured the approbation of his teachers during the past Session as to warrant the recommendation now made of the restoration of his stipendiary scholarship.

Mr. Chipperfield remarks, "I consider that he has decidedly improved." "He is a young man of good conduct and of considerable industry; he is very anxious to improve, and is most attentive to his duties and classes, but he is somewhat deficient in intelligence, ability and acquaintance with English."

Government Student Gregory, and Lane Scholar Dhanakoti Rajoo have, as on former occasions, secured the approbation of their teachers by their conduct, attention, ability and zeal. In July last Mr. Gregory passed successfully the Preliminary Scientific Examination of the University, and he purposes appearing in a few days for his "First Examination" for the University Degree of M.B. and C.M.

Mr. Dhanakoti Rajoo will also appear in a few days for his "Preliminary Scientific" and "First Examinations."

Mr. Tyrrell, a private student, having finished his first year of study, will also appear before the Preliminary Scientific Examination Committee of the University.

The conduct of all these candidates for medical honors has been unexceptionable.

(B.) *Second Department.*

At the commencement of the academic year, the Second Department consisted of,—

8	First Class	Students	in their	3rd year,
12	Second	do	do	2nd „
20	Third	do	do	1st „

making a total of 40 students. Eight students, constituting the Senior Class, having been found qualified as Assistant Apothecaries, leave College; one lad resigned the service, and 31 names remain on the roll of this Department.

The Final Examination Committee speak of the inferiority of the candidates to those of former years. As a whole, the batch is but a mediocre one, though Currie and Douglas are certainly rather more than average lads. It must be remembered that these lads have been educated upon that faulty system which has been corrected under Order of Government No. 84, dated 29th March 1865. The new rules necessitate a two years' preliminary hospital training before lads can join the Second Department of the College. The entrants of Session 1867-68 will be the first who shall reap the full

advantage of the new regulations. The conduct of all the young men of the First Class of the Second Department has been very satisfactory.

Second Class, Second Department.

The Second Class of the Second Department, taken as a whole, has done fairly. The results of the class examinations conducted by Committees of Professors, show that at the oral examinations in Physiology, Materia Medica and Practical Pharmacy, they have gained a high proportion of favorable marks; that at the oral examination in Anatomy, they have done well, and that in Surgery and Medicine, they have acquitted themselves fairly. In Minor Surgery, they failed. With the exception of the examination in Materia Medica, the written examinations on the several subjects of study have been less creditable to the class than the oral. In Medicine, they obtained but 42 per cent. of favorable marks. Dale is the most intelligent, and Ramachendra Numby the most deficient lad of the class. The conduct of these lads has been good.

Third Class, Second Department.

The 3rd Class of the Second Department, consisting of 19 students, taken as a whole, has done but indifferently this Session. Thirteeen lads passed a creditable examination before the Committees of Professors, but the rest have failed more or less signally.* At the oral examinations in Chemistry, Materia Medica and Anatomy, they acquitted themselves creditably; also at the practical examinations in Chemistry and Pharmacy. The written examinations in Chemistry, Materia Medica, and especially in Anatomy were less satisfactory.

* 1 Brown.
2 Whittaker.
3 Downing.
4 Currie.
5 Hayes.
6 Newnan.

The written examinations of the 2nd and 3rd Classes of the Second Department this year show indubitable marks of haste and carelessness, as if the students were under the impression that the *written* was of less value than the *oral* examination, whereas the fact is exactly the reverse, for the results of *written* constitute a better test of the progress and knowledge of the student than those of the *oral* examinations.

The conduct of the lads in this class has been good.

The following lads of the 2nd Class of the Second Department are recommended for discharge on the ground of incompetence.

N. B. Ramachendra Numby.
G. D'Santos.

and of the 3rd Class of the Second Department—

G. Whittaker.
J. Hayes.
S. A. Newnan.

The following lads of the 3rd Class of the Second Department are recommended to be remanded :—

S. Downing.
R. Currie.

(C.) *Junior Department.*

At the commencement of the Session the Junior Department consisted of—

23 First Class Students in their 2nd year
32 Second do do 1st „

making a total of 55 students.

Twenty-two lads,* constituting the Senior Class, having been found qualified to act as Hospital Assistants, leave College.

* One lad was sick in Hospital.

Thirty-three students remain on the roll of this Department. Of the students who appeared before them, the Final Examination Committee report as follows :—Only 22 students of the Junior Department presented themselves for examination, and all these passed. It must however be particularly borne in mind that though table No. 3 shows such marks as "*good*" and "*very good*" opposite several names, the examination *was of a most elementary character*, the Board remembered that the duties of Hospital Assistants had been defined by Government as *simply mechanical*, and it is *for such duties only* that these young men are fitted." The Examination Committee here refer to the terms of Government Order, No. 84, dated 29th March 1865, para 7.

Second Class of the Junior Department.

The 2nd Class of the Junior Department acquitted themselves fairly at the annual class examinations. In Anatomy, the percentage of favorable marks was 83 ;

in Minor Surgery 77; in Practical Pharmacy 70, and in Materia Medica 61. One lad, R. Moorgasen, No. 816, was absent from all these examinations. The conduct of the young men of the Junior Department has been good. A few of them have been punished for irregular attendance at the Hospital and Dispensary. The students of the Junior Department are instructed by the College Assistants, the Professors holding occasional examinations of the several classes.

The Senior Class met for instruction in Surgery under Mr. Wood 135 times, including 71 examinations. The Senior and Junior Classes met under Mr. Wood for instruction in Minor Surgery 31 times. Mr. Hamilton directed the studies of the Senior Class in Medicine, and of the Junior in Anatomy; the former class met 135 times, including 62 examinations, and the latter 133, inclusive of 48 examinations.

Mr. Ailsworth took charge of the classes of Materia Medica and Practical Pharmacy, the former of which met 134 times, including 35 examinations, and the latter 34 times.

At an early period of the Session it was found necessary to relieve Mr. Wilkins of all duties in connection with the Junior Department, the labour imposed upon him by the new arrangements being sufficient to engage all his attention. The tuition of the Junior Class in Anatomy was entrusted to Mr. Hamilton. The following lads of the Junior Department are recommended for discharge on the ground of incompetence:—

L. Solomon, No. 820. | Shabudeen, No. 815.
P. Rajagopaul, No. 823. | R. Moorgasen, No. 816.

Private Students.

Three private students attended certain classes of the College during the past year, and the sum of Rupees 120 in fees has been placed at the credit of Government.

General.

Prizes and Medals.

8. The Johnstone Medal has not been awarded this year. The Government Gold Medal has been assigned to C. M. Rungasawmy, No. 783, a student of the Senior Class of the Junior Department.

A small sum of money (Rupees 46-4-6) which formed part of a sum placed at the disposal of the Medical College

for the purchase of prizes by the late C. V. Conniah Chetty, Esq., was, with the sanction of the Director of Public Instruction, expended in the purchase of a small case of instruments, and under the designation of "the Conniah Chetty Prize" will this day be presented to C. Chinapoo, Government student, Senior Department. At page 21 of the last annual report, regret was expressed that the consignment of prize books had not arrived in time for the Anniversary of the College. The books reached the College on the 16th of March 1866, and the prizes were duly forwarded to the successful candidates.

The Library.

9. Five hundred and forty-five volumes have been added to the Library since the date of last report. A list of additions and donations is given in the appendix. The Student's Library contains 384 volumes.

The Museum.

10. Thirty-three additions have been made to the Museum during the past year. The thanks of the College are tendered to Mr. Honey for the various specimens of drugs presented by him to the Museum of Materia Medica, and to Mr. Sausman, Assistant Apothecary, for contributions to the Museum of Botany

Text-Books.

11. At the date of last report a reference regarding the supply of text-books to the students was under the consideration of Government. Under order dated 8th September 1865, No. 246, Government declined to assist the students in the purchase of their text-books.

Assistants, Prosectors, &c.

12. A list of the Assistants of the College and of the Students, Prosectors, &c., is given in the margin. A reference to the annual reports of the several Professors will show how assiduously and satisfactorily the Assistants to the Professors have performed their onerous duties during last year. Since last report Government have sanctioned the retention by the College of Mr. Wilkins' services on his promotion to the grade of Second Apothecary. Mr. Ailsworth, the Native Assistant, a painstaking and intelligent teacher, appeared before the Final Examination Com-

Assistants.
Messrs Wood, Wilkins, Harvey, Hamilton, Ailsworth.

Prosectors.
Gregory, Ellis, Douglas, Rath, Dale, and Rungasawmy.

mittee as a candidate for admission to the grade of Assistant Apothecary, and passed a most successful examination. The Committee allude to his qualifications in very flattering terms. It would be much to the advantage of the College were Mr. Ailsworth's services continued in connection with it.

The Prosectors have performed satisfactorily such duties as scant leisure enabled them to undertake. The Clerk, Librarian, Draughtsman, and other servants of the Institution have given satisfaction.

Sickness.

13. In last report notice was taken of the fact that much disease of an Asthenic character had occurred among the students during the Session. Dr. Paul has submitted a memorandum, showing that the ailments of the students during 1865-66 have been of a comparatively trifling character. No deaths have occurred among the College Students during the past Session.

HISTORICAL.

Historical notice.

14. A short historical notice of the principal events which have occurred since the last Anniversary of the Institution may fittingly conclude the present report.

(A.) In the historical retrospect of Session 1864-65, the principal features of Government Order No. 84, dated 29th March 1865, were indicated. Before the close of the Session a Notification* was issued by the Principal Inspector General embodying the rules sanctioned by Government in so far as they referred to the admission of lads to the Second Department. Subsequently, under date 20th November 1865,* Government sanctioned the rules proposed by the Head of the Medical Department for the preliminary training in hospitals and dispensaries of Paid Medical Candidates and Paid Medical Pupils. The several changes sanctioned by Government were brought into operation so far as this Institution is concerned during the past Session, 1865-66. The course of lectures on Hygiene commenced on the 30th of November, and that on Comparative Anatomy was delivered during the Summer Session.

* Dated 22nd April 1865.

* Order No. 331.

The new curricula of study were at once brought into operation, care being taken that the change from the old to

the new arrangements should be made without injuring the completeness of the courses of study of the several Departments. In consequence of the Division of the academic year into a Winter Session of six months' and a Summer Session of three months' duration, considerable alterations had to be made in the arrangements of days, hours, lectures, and examinations.

(B.) In a despatch from the Right* Honorable the Secretary of State for India,† dated 30th December 1865, No. 6, the Secretary of State indicates his view on questions connected with the operations of the Medical College of Madras. In this despatch, Sir C. Wood expresses his approval of the principle :—

* Vide Appendix.

† In reply to a communication from the Madras Government dated 13th February 1866, No. 43.

1. "That the course of education given in each Department should be fitted to qualify the young men under training for the duties of the particular class of appointments which they are destined to fill, and that it is not expedient to aim at qualifying them for higher duties, which some of them may, under exceptional circumstances, be called on to discharge." Further,

2. That in order to make it safe and proper to act on this principle, "it is necessary that provision should be made for the performance of such higher medical duties, by maintaining each class of the medical service in a state of numerical efficiency." Further,

3. The Secretary of State, referring to his Despatch of 28th July 1859 (No. 4), in which he called "attention to the propriety of extending the class of Sub-Assistant Surgeons, on account of the stimulus which the measure would afford to the entrance of an increased number of young men into the College, prepared to prosecute Medical studies in their higher branches," re-asserts the principle, and regards such a measure (namely, the extension of the class of Sub-Assistant Surgeons), as equally necessary for filling up those numerous appointments in the public service, which are beyond the acquirements to be expected in the class of Apothecaries on the one hand, and for which the establishment of the Commissioned Medical ranks is quite inadequate on the other.

4. The Right Honorable the Secretary of State further recognizes "that there is at present no such prospect of private medical practice among the native society of the Madras Presidency as would induce many young men of education to aim at high medical qualifications without the prospect of Government employment." But he points out how desirable it is that this object, one of the motives which led to the establishment of the Medical College, should be kept in view. Finally; he directs that the College curriculum and the requirements of the University should be brought into strict harmony.

This Despatch is the Magna Charta of this Institution.

(C.) On the 5th of April last, under instructions from the Director of Public Instruction, the Principal of the College issued a Notification containing certain alterations in the rules affecting the Government Scholarships. The scholarships, which were five in number,* and of the value of Rupees twenty per mensem each, are to remain the same as regards number, but are to undergo certain changes in the amounts of the stipends. To candidates who have passed the Matriculation Examination of the University (obtaining one-third marks in English), a scholarship on the old rules will be given, but to those who have passed the First Examination in Arts special advantages will be held out. They are to receive a stipend of Rupees twenty per mensem, to be increased to Rupees thirty on passing successfully and at the regulated time, the "Preliminary Scientific Examination," and a further increase to Rupees forty per mensem, on passing the "First Examination" for M. B. and C. M. of the University. These rules constitute a decided improvement upon the old. A paternal Government has done much; it is for an enlightened and sensible native public to meet Government at least half way. Government service is a limited field. Spheres of private practice in the native community, though very limited now, will doubtless become more and more extended, as education and civilization progress.

* Vide Notification, dated 20th May 1861.

(D.) Under date the 8th September 1865 there issued from the India Office "Amended regulations for the examination of candidates for the appointment of Assistant Surgeon in Her Majesty's Indian Medical Service." All natural born subjects of Her Majesty of a certain

age and of sound bodily health, may be candidates. The certificates of this College are received by many of the Medical Colleges and Schools at home, hence the way is open, by which the students of this Institution and Medical Graduates of this University may obtain appointments in Her Majesty's Indian Medical Service. Of the graduates of this Institution two hold Her Majesty's commission, and of those who have been mainly or entirely educated at this College, four at least hold commissions in this Presidency. It is much to be desiderated that those interested in the advancement of medical science either for its own sake, or because it is an important branch of general education; or because they are desirous of helping on schemes of general philanthropy and usefulness, would consider how practically their good wishes and views could be carried out by founding scholarships in connection with this Institution, and by giving encouragement to deserving students in the shape of medals, gifts of books, &c. Already the Lane Scholarships have been productive of good; may we be permitted to point to them, and to say to those desirous of commemorating in India the name and worth of some distinguished Indian public servant, "Go and do likewise."

(E.) Under date the 18th August, No. 297 of 1865, the Government of India ruled that, pending a reference to the Home Government, the enlistment into the Medical subordinate service of persons who though born in India are the sons both on the side of the father and that of the mother of natural born British subjects, is prohibited. A subsequent reference on the point elicited from the Indian Government a communication cancelling this prohibition, provided such persons were not attested as soldiers. Some alteration in the Mutiny Act is contemplated to bring these persons within its provisions.

(F.) Under order No. 350, dated 18th November 1864, Government approved of certain alterations and additions to the Medical College buildings being made, at an estimated outlay of Rupees 43,200. The work was commenced in May 1865, and is still going on. It is to be hoped that every effort will be made to push it forward, and so put an end to the great inconvenience which at present exists. It is very desirable too that the esplanade lying to the North, East and South of the College building should be neatly

railed in and planted, and made over to the College. A fitting and ornamental appendage to the building would thus be secured.

(G.) By order of Government, No. 87, dated 27th March 1866, the Principal Inspector General of the Medical Department was appointed "Ex-officio Visitor" of the College.

The Principal in concluding this report, cordially thanks his brother Professors for the uniform assistance and support they have afforded him during the past Session.

A Quinologist sanctioned for Ootacamund.

Proceedings of the Madras Government.

Read the following Despatch from the Right Honorable the Secretary State for India, (Public), to His Excellency the Right Honorable the Governor in Council, Fort Saint George, dated India Office, London, 17th October 1866, No. 34:—

1. With reference to the recommendation contained in your Despatch to my predecessor, dated March 13th, 1866, that a Quinologist should be stationed at Ootacamund for three years to investigate various questions connected with Cinchona cultivation, I have now to inform you that I have, at the recommendation of Dr. Frankland, appointed Mr. John Broughton to this post. Mr. Broughton has worked as Dr. Frankland's Assistant, at the Royal Institution in Albemarle Street, and I am assured by that eminent Chemist that he has been occupied with organic chemistry for several years, that he has made original investigations of his own, and that he is already intimately acquainted with the chemistry of the Cinchona plant.

2. I herewith transmit, for the information of your Government, a copy of a letter which I have caused to be addressed to Mr. Broughton, informing him of the nature of the duties that will be expected from him, and directing him to report himself to the Secretary to your Government, in the Revenue Department, on his arrival at Madras. His appointment is for three years, and I have fixed his salary at £1000 per annum. I have also allowed him 150*l.* for outfit and passage, and a sum not exceeding 200*l.* for the provision of the necessary apparatus and chemicals, which will be shipped for transmission round the Cape.

3. It will be for your Government to decide, in consultation with Mr. McIvor and Mr. Broughton, whether the latter gentleman shall reside at Ootacamund or at the Neddiwuttum plantation ; but it will be necessary to furnish, at one or other of those places, a room for a laboratory with a smaller room opening on it, and a supply of water.

4. Mr. Broughton will leave England by the Steamer of the 20th of November.

5. I have also had under my consideration, in Council, your Despatch, in the Revenue Department, dated May 25th, No. 24, 1866, reporting your proceedings in connection with the appointment of a Commission for testing the value of Cinchona alkaloids, other than quinine, as febrifuges ; and requesting that further supplies of the sulphates of these alkaloids may be transmitted to Madras.

6. The arrangements of Dr. Shaw, the Officiating Inspector General of Madras, appear to be very judicious, with a view to testing the efficacy of Cinchonidine, Quinidine, and Cinchonine as cures for fevers ; as well as for trying the bark, twigs, and leaves of the Cinchona, as simple decoctions. I am not, however, of opinion that it will be advisable, in the present state of our knowledge, to include Quinium amongst the febrifuge alkaloids to be experimented upon by the Commission.

7. One hundred and fifty ounces of the sulphates of each of the Cinchona alkaloids have been ordered from Mr. Howard, and will be shipped for Madras as soon as they are delivered to the Stores Department of this office.

8. I also herewith transmit thirty copies of a pamphlet by Dr. Gustave Planchon on Peruvian Barks,which has been translated from the French. Copies should be supplied to Mr. McIvor, and others who are engaged in Cinchona cultivation as well as to Dr. Shaw and the members of the Commission appointed to report upon the Cinchona alkaloids.

From Herman Merivale, Esq., to John Broughton, Esq., Royal Institution, Albemarle Street, dated India Office, 22nd Sept. 1866.

1. I am directed by the Secretary of State for India to inform you, that it is his intention to employ an Analytical Chemist to conduct investigations in concert with the Superintendent of Cinchona-Plantations on the Neilgherry Hills ; and that, at the recommendation of Dr. Frankland, he has resolved to offer you the appointment,

2. You will be under the orders of the Madras Government from whom you will receive instructions, and to whom you will report the

results of your investigations from time to time. It will not be necessary, therefore, to do more, on this occasion, than indicate very generally the nature of the duties that will be expected from you, and of the results that it is desired to secure from your labours.

3. The objects of the Government in introducing the cultivation of Cinchona plants into India, were the provision of an abundant and cheap supply of the febrifuge derived from them for the use of hospitals and troops in India, and the spread of the Cinchona cultition throughout the hill districts, in order to bring the remedy within the reach of all classes of the native population. The oldest trees on the Neilgherries have now been planted out for nearly four years, and the analyses of their barks, which have been made by Mr. Howard, prove that there is a very marked increase of the yield of febrifuge alkaloids under cultivation. The time has now come, therefore, when it is necessary to investigate the causes which regulate the yield of alkaloids from cultivated Cinchona barks, and to ascertain the preparation of the febrifuge which will combine cheapness with efficacy in the greatest degree. To attain these very important objects, the Secretary of State considers that a scientific Chemist should be associated with the able and intelligent cultivator who now superintends the plantation.

4. The analysis of bark from plants growing in different situations by a competent scientific Chemist on the spot, will be a principal means of discovering the conditions as regards elevation, climate, soil, and exposure, best calculated to produce the largest possible yield of alkaloids, those conditions of course varying with the different species. There are several difficult questions connected with the formation of the alkaloids in bark, and particularly with the changes in the alkaloids themselves, caused probably by cultivation, which should be carefully and diligently investigated. It will also be an important duty of the Chemist attached to the Cinchona plantations, to ascertain the difference, as regards yield and efficacy, between green and dried barks, and to make accurate analysis of the leaves, and hereafter possibly of the flowers of the different species. The best method of drying the bark must be decided by scientific experiments ; and, finally, it will be expected from the Chemist that he should, through his investigations, enable Her Majesty's Government to arrive at a decision with respect to the best and cheapest method of preparing the febrifuge for use among the laboring classes of the natives of India. He will also be required to consider the questions connected with the manufacture of the Cinchona febrifuge for the use of hospitals and troops in India.

5. Dr. Frankland has assured Lord Cranborne that you have been occupied with organic chemistry for several years, that you have made original investigations of your own, and that you are

already intimately acquainted with the chemistry of the Cinchona plant; and His Lordship therefore feels justified in the expectation that you will prove competent to perform the difficult and important duties to which I have briefly alluded, in a way which will give satisfaction to the Government, and that you will advance a branch of science which, in its bearings on Cinchona cultivation, has now become of great economic importance.

6. Your investigations should be carried on after consultation with the cultivator who is in charge of the plantations, and I am to impress upon you the great importance of acting, on every occasion, in concert with the Superintendent of Cinchona cultivation. It will be useful also if you were to put yourself in communication with the Medical authorities, with reference to the investigations which are now in operation with respect to the comparative value of the different alkaloids.

7. Your periodical Reports are to be made direct to the Madras Government.

8. You are required to undertake to serve the Government for three years, on a salary of £1,000 a year. You will be allowed a sum of £150 for outfit and passage, and a sum not exceeding £200 for the provision of the necessary apparatus and chemicals, which will be payable at this office. The latter sum of £200 will be exclusive of freight and transit costs.

9. It is desirable that, in the event of your accepting this appointment, you should proceed to the Neilgherry Hills with as little delay as possible, and that you should arrange for the shipment of the laboratory previous to your departure from England.

10. On your arrival at Madras, you will report yourself to the Secretary to the Madras Government, in the Revenue Department.

ORDER THEREON, 14th December 1866.

1. Communicated, together with the enclosures, to the Superintendent of the Government Cinchona Plantations, and to the Principal Inspector General of the Medical Department.

2. Communicated also to the Accountant General with reference to paragraph 2 of the Despatch, and paragraph 8 of the enclosure.

3. With reference to paragraph 3 of the Despatch, Mr. McIvor will state whether suitable accommodation already exists or can be easily and cheaply provided for Mr. Broughton at Neddiwuttum. The Government are inclined to think that the best plan will be to constitute Ootacamund Mr. Broughton's head-quarters, at all events at first.

4. As the Secretary of State does not consider it advisable (paragragh 6) that Quinium should be included amongst the febrifuge

alkaloids to be experimented upon, no action need be taken by the Principal Inspector General Medical Department, on paragraph 2 of G. O. 6th November 1866, No. 3020.

5. The pamphlet referred to in paragraph 8 when received will be distributed as directed by the Secretary of State. The only two copies as yet received will be sent to the Principal Inspector General Medical Department, and Mr. McIvor.

Concession to Deputy Inspectors General of Hospitals.

The following extract from a Despatch from the Secretary of State dated 27th September 1866, has been published by the Governor-General for general information :—

Para. 5.—I have to inform you that I have decided that a Deputy Inspector General of Hospitals of the Indian Medical Service, above the age of 55, who, from ill-health, may be unable to complete the five years' service required to entitle him to the annuity* in addition to the ordinary retiring pension, shall be entitled (in common with other Medical Officers who, having attained the age of 55 years, may not be able to obtain the certificate of competency), to retire on the next higher rate of pension to that to which his length of service entitles him, provided that he be not already entitled to retire on the higher rate, viz., £700 a year.

6. This concession only applies to those Medical Officers of the Indian Service who entered the service before the promulgation of the Royal Warrant of 13th January 1860.

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* £250, paras. 36, 37 of Despatch No. 340, 7th November 1864.

BOOKS RECEIVED.

1.—On the Advantages derivable to the Medical Profession and the Public from the establishment of Village Hospitals. By Albert Napper, F. R. C. S. &c. Third Edition, 1866, Pamphlet 8vo. pp. 20. Lewis, London.

2.—The Science and Practice of Medicine. By Wm. Aitken, M.D., Professor of Pathology in the Army Medical School, &c. &c. In two volumes. Fourth Edition, 1866. 8vo. pp. 963, 1010... ..... Griffin & Co., London

3.—The Madras People's Almanac and General Directory for the year 1867. No. viii. 1867. 8vo, pp 450 and lv. .... Gantz Brothers, Madras.

4.—The Practice of Medicine. By T. H. Tanner, M.D., F.L.S., &c. Fifth Edition, 1865 8vo. pp. 938 .. Renshaw, London.

5.—Hooper's Physician's Vade Mecum. Seventh Edition. By Drs. Guy and Harley, 1864. Folscp. 8vo. pp. 791..... ..... Renshaw, London.

6.—A Practical Treatise on Urinary and Renal Diseases, including Urinary Deposits. By W. Roberts, M.D., &c. Small 8vo. 1866, pp. 516.... Walton and Moberly, London.

7.—The Influence of Food on Race. By W. W. Ireland. Reprinted from the "Dietetic Reformer." 8vo. pp. 4..... ,, ,,

PERIODICALS RECEIVED.

The Indian Medical Gazette. November and December 1866.

The Edinburgh Medical Journal. June, November and December 1866.

The Medical Mirror. November, December, 1866 and January 1867.

The American Journal of the Medical Sciences. April and October 1866.

The Ceylon Quarterly Medico-Chirurgical Journal. June and Sept. 1866.

THE MADRAS
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PART I.

ORIGINAL ESSAYS.

ART. XII.—*A reply to the objections against dry conservancy as urged by* Captain H. TULLOCH, R.E., *in Chapters III. and IV. of his "Report on a project for the drainage of the Town of Madras."* By W. R. CORNISH, Surgeon; Secretary to the Inspector General, Madras Medical Department; Author of "The Cleansing of Towns," &c. &c.

IN the beginning of the year 1864, when the Prison Committee of Bengal had reported so favorably on the system of earth sewage recommended by the Rev. H. Moule, and when the general introduction of the system into our Military Cantonments, Hospitals, and Jails, was officially ordered, it occurred to me that a simple explanation of the principles on which earth sewage was applicable to tropical countries might be found useful by those entrusted with the execution of the experiment. Hence the publication of my pamphlet of twenty-four pages of original matter "ON THE CLEANSING OF TOWNS," in which I advocated, on what appeared to me to be sound scientific principles, the peculiar suitableness of the dry system for the removal of human waste from large or small populations within

tropical latitudes. In taking upon myself this self-imposed duty, I had no other object than to make known, as widely as possible, the advantages of a practice which, immediately I had read Mr. Moule's paper, struck me as the one thing wanting in the admirable system of dry conservancy advocated by Dr. Hathaway, with which every body in India was more or less familiar.

In the month of July 1863, I reviewed Mr. Moule's paper, in a series of articles contributed to the "*Athenæum and Statesman*," and so far as I am aware, may lay claim to the credit (if there be any) of being the first person in India to recognize, and publicly point out the value and suitableness of Mr. Moule's suggestions, in regard to Indian conservancy. More than this, however, I do not claim. I decline "with thanks" to mount the high pinnacle which Captain Tulloch has been so good as to assign me in the following passage, (p. 73) :—

"Throughout this report I have argued the question of "universal dry conservancy or sewers" as against Doctor Cornish, considering that by the publication of his pamphlet on the "Cleansing of towns," he has, as it were, constituted himself the exponent and advocate of the former system in Madras; and while doing so, I have at the same time endeavoured to meet all the objections to sewers, which I have heard or seen stated, by those who have adopted the new theory. Having been entrusted by Government with the preparation of a project for draining the town, I have felt it incumbent on me to go into the question of dry conservancy very fully, as my silence on the subject might have been construed into an admission on my part, that drainage by sewers was not the best, the *only* means of cleansing the town. I am not aware that any other gentleman besides Dr. Cornish has really proposed to dispense with sewers."

Captain Tulloch's official report consists of 120 pages of printed matter. Of these, fifty-four pages are devoted to a criticism of my pamphlet, and to arguments showing the impossibility of dry conservancy being applied to a town like Madras.

In connection with this subject, Captain Tulloch has been good enough to single me out for especial notice, and to argue the points at issue in a personal tone, as against myself. My first impression was to take no notice of an attack of this nature, but as many of my friends thought that my silence might be misconstrued, I had no option but to

reply, lest it should be inferred that Captain Tulloch's statements and figures were unimpeachable.

By the publication of the pamphlet which has been such a stumbling block in Captain Tulloch's path, I claim to be responsible only for the facts and opinions that I have given expression to, and not to Captain Tulloch's or any other persons inferences drawn therefrom. I object *in toto* to having words put into my mouth, which I never used, and to be represented as the only gentleman "who has really proposed to dispense with sewers," when, in point of fact, I never entered into the discussion of the means to be employed to drain the town of its waste water. I can understand and make allowances for Captain Tulloch's warm advocacy of his own scheme for the drainage of the Presidency town. He had been engaged for many months in planning a system of sewers, and had laboured zealously at his vocation, when my pamphlet, advocating "dry," instead of "wet" sewage, appeared. It was no doubt a most important thing for Captain Tulloch to demonstrate that dry conservancy would not do all that its advocates gave it credit for, otherwise much of his toil and labour in the designing of plans, and in the calculation of estimates would have been wasted; but in criticizing my pamphlet I have to complain that Captain Tulloch has, in putting forward his own views, and unintentionally no doubt, unfairly represented some of the more important points wherein we differ, and that the calculations he has gone into to prove the absurdity of a proposition to rid a large town of animal excreta by the "dry" method, are useful only as a warning to those who rashly appeal to figures without making quite certain that the data on which they base their calculations are correct.

From some statements in Captain Tulloch's report, (which have no immediate reference however to the points in dispute between us), it may be shown that his method of dealing with figures is, to say the least, peculiar, and such as to suggest a doubt whether he really understands some of the questions on which he has pronounced such decided opinions.

I shall refer to two instances only, for I desire to keep my remarks within readable compass. At page 15 of the report, Captain Tulloch gives a table showing what he believes to be the average population per house in Madras. In order to arrive at this desirable result, his course of procedure is note-

worthy more for its simplicity than its accuracy. He takes the number of houses assessed by the Municipal Commissioners, and the population of each assessment division, and divides the latter by the former. There would be no objection whatever to this formula, provided that all the members of the population lived in houses borne on the assessment books of the Municipality. But unfortunately for Captain Tulloch's figures, and the conclusions he draws from them, nothing could be more remote from the truth. A note from Mr. Jesudasen Pillay, one of the Municipal Commissioners of Madras, informs me that "no house, or hut of less estimated annual value than 14 "Rupees, is borne upon the municipal books," and he adds, "*There is no doubt that some thousands of huts in the city "do not appear in our returns.*"

Of this fact, Captain Tulloch might easily have satisfied himself. He must have spent months of his time in the survey of the city, and in visiting portions of it which are rarely seen by Europeans. He must have noticed in every direction the collections of mud huts, the "coopums," and parcherries—all teeming with human life, but the buildings in which are ignored by the Municipal officers in their assessment returns, and yet with these facts staring him in the face day after day, and week after week, he can draw no other conclusions from his table of houses and population than the following:—

"In London the density of the population, with reference to the houses, is about five. A Madras dwelling, therefore contains more than two-and-a-half times the number of people which a London house does. The density of the population of the Northern portion of Madras, 20·7 (per house) is extraordinary, being more than four times that of London. Even this is rivalled by some of the villages, such, for instance as Royapett, which has a population of 19,210 and only 620 houses, the density being nearly thirty-one. Is it possible that a population of nearly twenty thousand can be living at the rate of 31 in a dwelling, and *such dwellings*? and if this is the average density over the entire village, how many men, women, and children must there be in some of the houses? It is not surprising that Cholera should be endemic in Madras."

It will be seen that Captain Tulloch has conjured up this terrible monster of overcrowding in houses, without the slightest foundation in fact. The northern district of Madras, he says, is more than "four times as densely populated as London!"

This, it must be remembered, is the deliberately expressed opinion of an officer who has surveyed the district, and who might reasonably be supposed to be gifted with ordinary powers of observation and comparison. If Captain Tulloch had not been so ready to appeal to figures in this matter, without a due consideration of their real import, he would not have committed himself to the use of such strong language, on so slender a basis of fact.

The real truth, with regard to the density of population in Madras, can never be known until all the temporary huts, which afford shelter to so many thousands of the population, and which the Municipal Commissioners deem unworthy to be taxed, can be counted. Even in regard to the "assessed" houses, great variations take place year by year. In 1854, the number of "assessed" houses was 32,949. In 1863, as Captain Tulloch states, the Municipality taxed 32,610 houses. In 1867 Mr. Jesudasen tells me the numbers have fallen to 31,600.

But besides the untaxed mud huts, there are other sources of error. Thus the population within the Fort is counted in the general population returns, but the houses and barracks are unassessed by the Municipality. The vast number of native servants in the employ of European and East Indian families, reside generally in the quarters provided for servants, in the compounds of the several houses. In this way it would not be difficult to make out that the population of each house in the European quarters of the town, averaged from 30 to 100, yet it would be a false inference to draw from the fact, that overcrowding prevails in these establishments. Captain Tulloch's inference from his table is, that the population is too closely huddled together. I have shown that the table is based on figures which are worse than useless, because they tend to mislead casual readers of his report, and I deny altogether the assumption that the population of Madras—a town mainly built of one-storied houses, which occupy a considerable surface area—in any given locality is denser than that of a similar area in London. I believe that Mr. W. Huddleston, some years ago when Secretary to the Board of Revenue, went into a calculation to shew that the average population per house in the whole of the Madras Presidency was between five and six.

Leaving out of the question the exceptional instances of houses occupied by Europeans, and in which large

numbers of native servants are quartered upon the grounds, there is nothing whatever in the actual condition of the native community of Madras to justify the belief that the average house population is in excess of that of the country generally.

I trust that I have said enough to show that the theory of overcrowding in the houses built upon the twenty-seven square miles of surface, on which the city of Madras stands, rests upon the most slender basis of fact.

The second instance of inability to comprehend the meaning of figures is contained in the following passage, (p. 119):—

"It has been urged that the cost of draining Madras, according to this project, will amount to as much as the value of all the house property in it, and that it will be better to remove the town bodily, as the Americans remove their houses, than to attempt to drain it. It is best to meet arguments of this kind by facts.

"*The value of a house is usually considered equal to thirty years' rental.*" (The italics are mine).

"The number and yearly rent of all the houses in the town may be obtained by any one from the Municipal Commissioner's Office, and the value of all the houses will be found to be 850 lacs of rupees or 8½ millions of pounds sterling.

"Half a million of pounds sterling (the assumed cost of this project) is not 6 per cent. on the value of the houses at present, and a good system of water supply and drainage will raise their value in the course of a few years by at least twenty per cent."

As will be seen from the passage which I have emphasised by printing in italics, Captain Tulloch estimates the value of a house at thirty years rental, and accordingly by multiplying the rental of all the houses in Madras by thirty he arrives at the conclusion that the present value of the house property is 8½ millions of pounds sterling. Now if he had estimated the value of a house at its actual market price, it would have been much more to the point, than taking a fancy-value which no one in his senses would think of paying. I have known instances in England of *freehold landed property* fetching 33 years purchase or more, but even in that favoured country, where the progress of decay is less rapid than it is in Indian buildings, ten or twelve years rental or purchase is considered to be the outside value of even the better class of *house* property in town or country.

The redemption of assessment on *land* in this Presidency, under the waste land rules is fixed, I believe, at twenty-five years' purchase. When *land* is required to be taken up for public purposes in Madras, the Collector allows compensation at the rate of thirty years' rental. Hence, probably, Captain Tulloch's error in regard to the value of *houses*. It is a well known axiom with dealers in land and houses, that whereas investments in land may be profitably made to yield only from three to five per cent., house property never pays for wear and tear and deterioration, unless it yields from ten to twelve per cent. upon the capital invested.

Let me give instances :—

1. Some freehold house property in the city of London, (in which I had a personal interest) yielded in round figures a rental of £400 per annum ; when sold, it produced £4,200 ; but according to Captain Tulloch's calculations it should have been worth £12,000. Unfortunately for myself and others, the bidders at the public auction did not adopt his view of the value of house property. (I wish from my heart that they had !)

2. The house in which I have been living for some time past in Madras, is let at a yearly rental of Rs. 1,200. It has recently changed hands at the price of Rs. 10,000. The owner I have no doubt would have been very glad to have found somebody willing to pay Rs. 36,000 for it, instead of the actual market value of a *little more than eight years' purchase.*

But if well-built "brick and chunam" houses in Madras sell as they ordinarily do, for less than ten years rental, what shall be said of a vast majority of the tumble-down "brick-in-mud" or simply "mud-walled" structures in which the native community dwell? Can it be believed of these dwellings, many of them not exceeding the annual value of Rs. 14, that they are worth so much as ten years' rental?

In all probability a very large majority of the native dwellings are not worth more than from five or six years purchase, but as in a question of this kind, one can afford to be liberal, I will take the value of the whole of the house property in Madras *at ten years' rental*, and then ask Captain Tulloch what becomes of his estimate of the cost of drainage works being "not six per cent. on the value of the houses at present?" If the facts I have given in regard to the

value of house property be correct (and any house owner will admit them to be so), I contend that the cost of drainage works, to say nothing of laying on a water supply, accepting Captain Tulloch's own estimates, would be nearer twenty, than six per cent. on the value of the houses. I leave out of question here the fact that many of the most valuable house properties would scarcely come within the influence of Captain Tulloch's drainage works.

It is to me most unaccountable how Captain Tulloch could have committed himself to such loose statements and reasoning as in the examples I have quoted, but now that I have given illustrations of this gentleman's mode of dealing with facts and figures, of which everybody is competent to form a judgment, the task which I have before me of refuting his arguments about the value of sewers and sewage, and objections to dry conservancy, will be considerably lightened.

When Capt. Tulloch makes the important concession that Dr. Norman Chevers has "laid down the true principles on "which drainage in this country should be carried out" (p. 70), and when in making this concession he admits that

"*The feculent excreta* and every kind of solid filth, road "scrapings and sweepings, stable litter, the refuse of knack-"eries, markets, tan yards, *urinaries*, gardens and cook "rooms," should be collected and carried away in conservancy carts, he grants, in point of fact, all that I have ever contended for. I have objected on strictly philosophical principles, and in the strongest of terms, to the mixing of human excreta with water, in hot countries, with the view to their removal. I have stated in the Mortuary report for 1859, and again in my pamphlet "On the cleansing of Towns," that the question at issue of the suitableness of a European system of sewerage for India is really one of temperature. That in European and other climates, where water of low temperature can be used, noxious gases are absorbed by it and decomposition retarded, and that the use of water under such circumstances is the cheapest and the least offensive mode of removing excrementitious matters.

But I have pointed out that water of a temperature above 60° Faht. is,—as all Chemists well know—incapable of absorbing gases; on the contrary, that at and above this degree of heat it gives off any gases which it might have

absorbed at a lower temperature, and becomes a promoter of rapid decomposition of organic matters dissolved or suspended, and is therefore an unfit vehicle for the removal of excrementitious matters, which in hot countries are only too prone to become dangerous to the public health under the most scientific adaptation of conservancy principles.

If Captain Tulloch, or anybody else, can suggest any feasible arrangement by which the water supply of Indian towns and villages can be kept at a temperature between 40° and 60° Faht., I have not the slightest objection to his using sewers for the removal of the excretions of the people, but until the required low temperature of the removing vehicle can be secured, I do most decidedly protest against the application of the European system of sewerage with its closets and house drains, and admirable contrivances for the effectual spreading of epidemic disease, to Indian towns. And in using the term "European system of sewerage," let it be clearly understood that I have never said, nor ever meant to say, that the waste and soiled water of an Indian town ought not to be got rid of. Captain Tulloch has chosen to infer from some expressions in my pamphlet, that I have proposed to dispense with drains altogether. I have, in reality, done nothing of the kind. I have urged that the adoption of a sound system of dry conservancy would do away with the necessity for "costly" drainage works, and in this opinion I know that some Engineers of established reputation are quite prepared to support me. Now if I had said that "no drainage works were required," Captain Tulloch would have been perfectly justified in arguing that I had proposed to dispense with all drains, but I expressly guarded myself as I thought from this construction by the use of the adjective "costly," and considering that the system of conservancy advocated in my pamphlet, would leave little else but the soiled water and house washings to be disposed of, I was, I submit, perfectly justified in concluding that with modifications and improvements in the present system of surface drainage, which Captain Tulloch himself admits to be a necessity even with his own project, the waste water might be disposed of, without involving the Municipality in a debt of half a million of pounds sterling. Captain Tulloch's outside estimate of the cost of the "project" submitted to Government, a project which, by his own showing, is designed chiefly to remove the "waste water" of the town (see page 26) is

half a million of money. If so extensive a scheme be really necessary for the removal of the least objectionable of the ingredients of "sewage," then I am free to admit I erred in stating that "costly" works were unnecessary. But before acknowledging the necessity of so elaborate a scheme as Captain Tulloch's for the removal of waste water from the town, I should like to know whether, in the opinion of other Engineers who have considered the question, the surface drains of the city might not, as a preliminary measure, be re-constructed so as to be made effective for the purpose? Although Mr. Fraser promises to be able to supply water at the rate of 20 gallons per head to each house, it is certain that very many years must elapse before this amount of water will be consumed daily by the average man or woman. As yet, no water supply is laid on to the 31,600 houses, and it is evident that it will be long before even a tithe part of the house property can be so supplied. If the surface drains were well laid out on a proper system, it seems to my unprofessional mind, that water would not stagnate and ferment in them as is now the case; but granting that some putrefaction must take place, I should prefer on sanitary ground to have the gases of decomposition diffused through and diluted by the atmosphere rather than concentrated in tightly-closed drains.

My views on the drainage of Madras, which I recorded in an official report to Government about six years ago, long before "dry conservancy" or "earth sewage" were talked about, I will here quote, that my sentiments may not again be misrepresented or misunderstood. With all the subsequent attention I have given the question, and admitting to the full the mechanical difficulties in the way of administering an efficient system of dry conservancy, difficulties which I will presently discuss at some length, I see no occasion to modify anything in the following passage:—

"The mechanical and engineering difficulties in the way of a perfect system of drainage for this town are not perhaps altogether insuperable. The question has been discussed by able Engineers whose opinions are on record, but whose surveys and estimates do not come within the province of extra-professional criticism. Granting the practicability of an extension of the best known system of sewerage, it yet remains to be seen whether the *uniform high temperature* which obtains here, has been sufficiently considered as an important element in the success or failure of any of the proposed plans.

"Sewage matters in temperate climates, are carried away from the neighbourhood of large towns without much decomposition. The River Thames, notwithstanding its pollution, is inodorous in the winter months, and so long as the temperature of the water remains low. But after a hot summer, and when the temperature of the water rises to 65° or 70°, chemical changes proceed more rapidly, new combinations are quickly formed (some of them perhaps constituting the germs of epidemic disease), sulphuretted hydrogen is evolved, and the whole atmosphere of the river banks is poisoned by its offensive odour. In Madras this state of things is *permanent*. Water in contact with organic matters at a temperature of from 80° to 90° brings about almost immediate decomposition. The actual temperature of shallow pools of water, or of the fluid in open drains of this town may be easily ascertained by direct experiment, but there is no doubt it is just the kind of "gentle heat" which chemists employ, when they wish to procure artificial decomposition, and disengagement of gases in the laboratory. It is a question therefore, whether the most perfect system of drainage, even supposing the sewers to be flushed twice in the twenty-four hours, would relieve Madras entirely of the offensiveness which attends the rapid resolution of organic matters into their ultimate elements.

"There can be no question under such circumstances as to the propriety of a rigid exclusion of all solid refuse from the present drains, or those hereafter to be constructed. Drains at the best in this country are evils, but they become doubly dangerous when they serve as receptacles for human ordure and other animal refuse. For these matters nothing will satisfy the requirements of a tropical climate but a daily removal beyond the limits of human habitation, where they should be employed, in the way Nature intended them to be used, as fertilizers of the soil."*

It will be seen from the above that I expressed views very nearly in accordance with those which Dr. N. Chevers published some years later, in regard to the principles of conservancy applicable to Indian towns. Captain Tulloch unhesitatingly adopts Dr. Chevers' views as "the true prin-
"ciples on which drainage works in this country should be
"carried out, and the only broad principles on which suc-

* The sanitary regulation of the Divine lawgiver, recorded in Deut. chap. xxiii. ver. 12, 13, is as important to the inhabitants of crowded cities of the present day, as it was to the Israelitish host, some 3300 years ago. With all our talk about "sanitary science," we are forced to admit that the soil of our lands "without the camp," or "city," is the only fitting receptacle, for the decaying animal or vegetable refuse of crowded communities. The problem yet to be solved is, how to convey the refuse of large towns to its natural destination without imparing its fertilizing properties, or endangering human life ? No system of drainage can be perfect, unless based upon a recoguition of the fact, that the soil is Nature's great disinfectant and purifier.

"cess can be assured at least cost." These "principles" provide, amongst other things, for the removal by scavengers of the whole of the excreta of the population, while the liquid matters and waste water are taken off "by sewers of moderate capacity," secured against the ingress of storm waters, while the rainfall is to be carried off by open surface drains. In reality, then, it seems that we are all agreed as to the mode in which the solid refuse of a tropical town should be dealt with. I have attempted to explain that I have no objection to the employment of open channels of proper slope and suitable material, for the removal of the soiled fluids of houses. As a Sanitarian, I should prefer, whenever practicable, open, to closed drains, for the reason that in the former when foul gases are evolved, they are immediately diluted and soon oxydized by the atmosphere, whereas in closed drains, where the fluid is of high temperature, there is always great danger to be apprehended from the concentration of the gaseous fumes resulting from decomposition. My fixed objection is to the employment of water of permanently high temperature as a vehicle for the removal of the excrementious matters of a population. It is some little comfort to me to think, that although my arguments may appear insignificant to those unacquainted with the principles of chemical science, yet that I am fully borne out in my views by the unanimous decision of the members of the late Sanitary Conference at Constantinople. According to Dr. Goodeve, the Conference "objects to the system of drains or sewers in connection with houses," holding that in practice "we can-"not prevent the diffusion of noxious gases through the "houses in connection with them, and that in times of "cholera, drains may spread the disease along a line of "houses in communication with them; and that owing to "the porosity and rapid decay of masonry work, they "readily allow of the impregnation and saturation of the "ground through which they run, with decomposing "organic matters." If this is the case in regard to drainage works in temperate climates, what would be the state of things in Indian sewers, where the liberation of the gaseous products of decomposition occurs so much more rapidly? The suitability of water as a carrier of sewage in the tropics, let me remark, is a chemical, and not an engineering question, and those only who pretend to an acquaintance with the laws of chemical philosophy are competent to take part in its discussion. Captain Tulloch, I ob-

serve, in his chapter on "Objections to Sewers answered," has never once alluded to the chemical considerations involved. He does not get beyond the old stock argument that because water is an excellent carrier of refuse in temperate climates, it will be equally effective in Madras, under climatic conditions wholly different.

All his examples of the efficacy of drainage works, and the utility of "sewage" as a fertilizer, are derived from England, where the temperature of the water employed, makes it well adapted for the object in view. I have already shown that cold and warm water have exactly opposite effects on the excrementitious matters of the human body; that the one retards decomposition, and that the other hastens it. The facts are incontrovertible, and upon a proper comprehension of them hangs the whole question at issue.

But Captain Tulloch may say of his project that he never contemplated the employment of water for the removal of the excrementitious matters of the town, and that he has expressly admitted that the "only true principle" of drainage in India, involves the maintenance of a huge army of scavengers for the disposal of these matters. There is, however, some appearance of inconsistency in regard to this portion of the project. In one place (p. 70) Captain Tulloch approves of the exclusion of urine from the sewers. In another (p. 106) he proposes that it shall be allowed to run into the drains, but does not explain the contrivances by which he would separate the fluid and solid excretions of the body. If Captain Tulloch really means to exclude the most fertilizing portions of the town sewage from the drains, why does he dwell at such length on the advantages of liquid sewage as a manure? We hear occasionally of the performance of the play of Hamlet, with the omission "by particular desire" of the part of the chief character, but Captain Tulloch is more ingenious still when he proposes to employ the liquid product of his drains, deprived of the essential elements of "sewage," in the fertilization of land.

He argues "that as river water in India applied to land will yield enormous profits," (p. 51) so must the waste water of the city. No doubt it would, provided it could be laid on in the ordinary way of irrigation, and that it did not cost many thousands of pounds to bring it to the point of distribution. But to expect the same results from fluid of this

kind, as from "sewage proper" with all its normal constituents unimpaired, shows, I am afraid, a very hazy and dubious acquaintance with the chemistry of the subject on the part of Captain Tulloch.

The application of liquid sewage to land in England has, I am aware, been a success under certain conditions as to soil and the nature of the crop cultivated. As a rule, the success has been greater in small than in large towns, and for this reason, that the human waste, on which the fertilizing power of liquid sewage mainly depends, has had no time to decompose, but has been diluted and applied to the land in a perfectly fresh state, with all its fertilizing properties unimpaired. Stiff clay soils, retentive of moisture, are said to be unsuited for the application of liquid sewage. The soil should be sandy, light and porous, and the crop which flourishes best under sewage irrigation is the Italian rye grass, which at Edinburgh, Carlisle, Croydon and some other towns, yields enormous returns.

As a rule, liquid sewage has failed when applied to root crops, and to grain, such as wheat or barley. It is found, practically, that it tends to the development of leaf and straw more than root or grain. For all practical purposes liquid sewage is employed mainly in the growth of green food for cattle, and for this purpose in the neighbourhood of towns it pays exceedingly well. Now for "sewage" to be of any marked benefit beyond what is obtainable from simple irrigation, it must contain something more than the dirty water which Captain Tulloch proposes to take out of town. Supposing, by way of argument, that Madras possessed a plentiful water supply, that it was laid on at high pressure to every one of the 31,600 houses, and to the public latrines, that each house or court-yard was fitted with a water-closet, cistern, drain traps, &c. complete, that the people used these conveniences, and that the whole of the excretions of half a million of people found their way into Captain Tulloch's drains:—

The "sewage" resulting might be thought most valuable, but is this quite certain? and does British experience help Captain Tulloch in coming to any trustworthy conclusions on the subject?

My reply is, that here again comes in the chemical question,—the influence of heat on organic matter in solution.

The most valuable constituents of sewage, in regard to the stimulation of green crops, are the nitrogenous matters which represent the human waste of large towns.

Now what would be the probable fate of the enormous amount of feces and urine sent into the drains every day? Every-body knows that urine is one of the most unstable of animal compounds, that at a high temperature and in the presence of decomposing matter, its elements split up and re-arrange themselves, that urea is converted into ammonia, that free ammonia escapes in large quantities or combines again with other unstable compounds, that in a few hours the greater portion of the most valuable ingredients of sewage would, at a given temperature, be dissipated in the form of gas or vapour which, with other gaseous products of decomposition would press back and pass through the water of the trapped drains, into the court-yards and house enclosures, or pass off into the air by the ventilating shafts in the sewers. Most people have an idea of the horrible odours of London houses on a hot September day, due chiefly to gaseous eruptions from sewers, but what is the temperature of the contents of sewers in London compared with the same in a place like Madras, where the mean temperature of the air is 80°? If sewers are offensive in English towns when the weather gets warm, they must become doubly so in Indian towns which are never cool. The more rapid the decomposition of the constituents of sewage, the less valuable will that fluid be for the purposes of the cultivator. If the ammonia escapes in a gaseous form, it is evident that it can't be applied to the fertilization of the land. The only practical evidence on the use of liquid sewage in India, with which I am acquainted, is contained in the "*Correspondence on the subject of the drainage of Bombay.*" It will be seen from the annexed extract that the results of the trial in that town were quite in accordance with what might have been expected, supposing my arguments against the use of water for the removal of sewage in tropical countries to be founded on objections based upon natural laws.

"Mr. Conybeare in 1853-4 attempted the application of the liquid sewage as manure in combination with an arrangement for obtaining an artificial current in the main drain.

"The sewage passing down the drain was intercepted by a transverse cut, or catch-water drain, and conveyed to filters constructed of sand and a peculiar trappite rock pounded into fragments. From

the filters it passed by its own gravity into a reservoir whence it was lifted by mechanical means, and allowed to flow over the ground to be irrigated. The site for these works was first near the Grant road, eventually some distance down the drain from the Bellasis road.

"It was assumed in this design for the disposal of sewage matter, that the benefits of irrigating with the water would readily be recognized by the cultivators; that the operations of the filter would be such as to render the filtered sewage inodorous, and that the artificial fall produced would have the effect of so far improving the main and branch sewers as to place the general drainage of the island on a comparatively satisfactory footing.

"The preliminary experiments, which appear to have been conducted by Mr. Conybeare with great care, *but on comparatively small quantities of sewage*, gave most satisfactory results. The sewage water issued from the filters quite inodorous, and heavy crops of vegetables were raised from the irrigated ground.

"*On the larger scale*, however, the sanguine anticipations of Mr. Conybeare were not answered by results.

"The irrigation, or rather the system which was at last adopted of allowing the sewage to flow at random over a salt morass—*in itself constituted a nuisance equal in intensity to that arising from the former state of the drain;* cultivators did not, in practice, appear to be conscious of any benefits to be derived from liquid manure.

* * * "The cost of these works being very heavy and their results quite incommensurable with that expense, they were closed by a resolution of the worshipful bench in 1855 or 1856." (The italics in this quotation are my own.)

Messrs. Wilcox and Tracy further add, as a reason, for not taking into account the use of liquid sewage for application to the soil:—

"Independently of the cost of supplying liquid sewage on a systematic plan of distribution, which method, on any except a very small scale, has been disposed of effectually some years ago, we are of opinion that the habits and ideas of Hindoo cultivators would require considerable education, before they would to any great extent adopt it. It is further a question whether years must not elapse before such valuable crops could be cultivated as would enable the cultivators to pay a covering rent for the use of the sewage water, during the whole of which period the distributory apparatus would remain a heavy charge on the Municipal or Government Treasuries." * * *

"Finally the distribution of liquid sewage as manure in large quantities, and without creating nuisance, has never yet been proved possible."

In this latter conclusion Mr. Robert Rawlinson, C.E., who was consulted by the Secretary of State for India in reference to the Bombay drainage scheme, did not concur. He does indeed casually recognize the fact, which I have taken so much pains to insist upon as the initial difficulty of all drainage works in India, namely, "the liability of injury to human health "being in proportion to the temperature of the atmosphere," but he argues that the sewage should be disposed of, if possible, "with advantage to the district." If this cannot be done, "then with the least possible injury."

A remark in the Bombay report, from which I have just quoted, reminds me that a very large proportion of the land upon which Captain Tulloch proposes to distribute the Madras sewage (see plan, page 110), is unsuited for the purpose. The soil on both sides of the northern canal is a stiff, unworkable, non-absorbent clay; the soil, in fact, which of all others is the least suited for sewage irrigation. Another more serious objection, is that the land lies so low, that it is invariably flooded by heavy rain, or by the overflow of the Courtelliar river. I have known three feet of water to stand on the identical spots shown in the map, as suitable for sewage irrigation, and the whole area to resemble a shallow lake for days together. The overflow of river water, mixing with that of the backwater and canal, makes the whole brackish. The land flooded by it is barren and unfertile, as any one may notice, who will take the trouble to examine the locality. The tract of sandy-soil nearer the sea would, in my opinion, be much better suited for the trial of sewage irrigation, supposing that Captain Tulloch's suggestions are ever carried out.

I think Captain Tulloch deserves much credit for attempting to work out the details of a system, which provides for the exclusion of the storm-waters from underground sewers —the rock, it seems to me, on which all former drainage schemes in this country have been wrecked. When in Calcutta last year, I was not a little astonished to observe a huge sewer being constructed from the southern end of the "maidan" along by the Race-course and General Hospital down the "Circular road," to join the main sewer leading away to the salt lake. This branch was big enough to enable me to walk upright in it, and in the upper part of its course, I have no hesitation in saying that the "sewage proper" of the locality might have been removed in a six inch

pipe. There is literally no population there to furnish sewage, and as I was given to understand, this enormously expensive sewer was made of its present capacity simply to carry off the pure rain water falling on the "maidan" in the monsoon months.

No wonder that the main outlet sewer in Calcutta requires, as Captain Tulloch states, to be "thirty feet wide," nor can we feel any surprise in learning that the adoption of this principle of drainage in India has already saddled the Municipality of Calcutta with an expense of a million sterling, while the works are still so incomplete as to be useless to the town. By some statements which recently appeared in the "Indian Mirror," it seems doubtful whether the works will not have to be abandoned from want of means to complete the original design. The borrowed money has been all spent, and the credit of the Municipality is gone. In my pamphlet (p. 23), I remarked "there are not wanting men "of eminence in sanitary knowledge, who have from the first "prophesied that the Calcutta drainage scheme would end "in a gigantic failure." By all that I could see, and have since read, the prophecy will be fulfilled somewhat sooner than was anticipated.

I have no objection to Captain Tulloch's scheme, viewed apart from its suitableness to the physical condition of the town, and the social condition of the people of Madras. His estimates, I see, do not provide for the surface as well as house drainage. With a proper system of dry conservancy it seems to me that both might be combined. So long as the animal excretions of the body are not attempted to be removed by water, I have no wish to quarrel with any scheme that is really practicable in Madras, but I fear that Captain Tulloch's plan is one that does not come under that category.

The important questions in regard to his project are (1) who is to pay for the improvement? and (2) are the circumstances of the great bulk of the people of Madras such as to warrant the supposition that they can afford the cost? It seems clear that the inhabitants of the Presidency town have no more claim to a grant of Imperial money, for the prosecution of drainage and water-supply works, than have the inhabitants of the smallest village in the provinces. The villager contributes as much, or more perhaps, to the Imperial revenue as the townsman, and has equitably the same claim as the latter for the Government assistance in keeping

his premises clean. In the cases of Bombay and Calcutta, the Municipalities have undertaken to raise the necessary funds for the prosecution of drainage works, and by no kind of special pleading with which I am acquainted, can a fair case be made out in favour of Madras being drained at the expense of the Imperial revenue. I know that the fact of Madras being the seat of Government is considered by some to be a sufficient argument for spending public money in keeping it clean, but on exactly the same principle, the cost of the London drainage works might be debited to Imperial rather than to Municipal revenue. What would the people of fifth or sixth rate towns in England say, if a proposal was made to drain London at the cost of the nation, simply because the houses of Parliament are located within the metropolis ?

If it be admitted then that the residents in one form or another, must bear the expense, let us consider briefly whether their circumstances are such as to enable them to undertake a work of such magnitude, as the construction of underground sewers for the enormous area covered by Madras. The town stands on twenty-seven square miles of surface. How thinly this area is in part populated may be imagined, when it is stated that out of the 17,280 acres of land included within the town limits about 3,521·9 acres, or one-fifth of the whole, are devoted to "wet" cultivation. Madras, in fact, is made up of a number of villages, and thinly populated agricultural tracts, which connect three almost distinct towns (Triplicane and Chintradrepett), (Periamoot, Vepery and Pursewakum), (Black Town and Royapooram). The great bulk of the people are so poor, that out of a population supposed to number nearly half a million, they can only afford to maintain 31,600 houses of, or above, the estimated value of 14 Rupees rental per annum. In this number are included the most valuable properties—the residences of the European and East Indian population—of the people who live in detached houses, widely separated from each other by "compounds" or enclosures, and which, from their position, can derive little or no benefit from the drainage works. Captain Tulloch says, "there must be 140 miles "of sewers or pipes, or if not, some parts of the town must "be left undrained. For whatever sum of money 140 miles "of drains can be laid down, for that sum only and for no "less can Madras be drained."

I notice that the Hon'ble Mr. Ellis states that there are 267 miles of public roads in Madras. The length of sewers required is therefore probably understated by Captain Tulloch.

But the mere construction or laying down of street drains is not the only expense that will have to be considered in a system of sewerage. Captain Tulloch has, so far as I am aware, given no estimate of the additional cost falling on the 31,600 house-holders, which would have to be incurred before the house drainage could be brought into communication with the public sewers.

It is suggested that three or four inch earthen pipes leading from the back yards of native houses to the street drains should be laid down "under the immediate direction of the Municipal Commissioners," but the cost of this operation, and of draining the thousands of buildings which are not entitled to be dignified by the name of "houses," is nowhere given. It is manifest that the cost of such works must depend upon the amount of excavation required and the length of piping necessary to join the public drain. In a large number of houses in the thinly populated districts, this expense would, from the distances involved, be very considerable. Assuming roughly that the average expense per "house" under this head, including alterations in the back yards to exclude storm water, sinks, traps, &c. would be 50 Rupees, then Rupees 15,80,000 would have to be added to the estimate. It is useless to argue, as Captain Tulloch does, that it is not his business as an Engineer to estimate for such things. The house owners, or Municipal Commissioners would have to pay for them, which is after all a consideration that closely concerns them. Without bringing the house drains into communication with the sewers, it is obvious that the latter could be of no use. I say nothing here about the introduction of the water closet system in connection with houses and public latrines as proposed by the Editor of this Journal in his late review of Captain Tulloch's project. Each house would require at the least a double apparatus of the kind; one for caste people and one for servants, and what with the laying on of water at high pressure, the provision of cisterns, closets, and all the paraphernalia of modern drainage according to the European system, it must be evident that as regards a very large area of the house property, the expenses would, as has been

apparently already pointed out to Captain Tulloch, exceed the value of the houses.

It must not be forgotten in the consideration of this question that the whole of the house sewage works would have to be supervised by imported skilled labourers,—that a large number of plumbers would be necessary to put up the apparatus and to keep them in repair. The people of Madras, I maintain, are not yet so advanced in civilization as to be able to appreciate a system of conservancy opposed to their prejudices and ancient customs, and which system, on purely scientific grounds is, I believe, unadapted to towns in the tropics.

I admit that property is increasing in value in Madras. The assessment of 1854, (which, however, did not include the whole property of the town) estimated the annual rental at 25½ lacs, or taking the liberal estimate of ten years' rental, at about 2½ millons of money.

The assessment for the present year, which however includes lands as well as houses, is based on an estimated rental of about 31½ lacs. So that it is not improbable that the property, land and houses, may now be worth about three millions. Allowing, for the imperfect assessment of 1854, the value of house and landed property in Madras, has perhaps increased by about twenty per cent. in the last thirteen years, but this increase is due more to the general advance in prices of labour and of all articles of supply in the country generally, than to any thing peculiar in the town itself. The population, as a rule, is not better housed now than it was thirteen years ago ; on the contrary, from the gradual decrease in the number of houses eligible for assessment, there is every reason to conclude that the enhanced cost of building materials and labour has had a marked effect in deteriorating the quality of the native house property generally, and that the people are less able to afford to spend money in solid work now than they did in years past. These considerations go to strengthen the supposition that the residents of Madras are wholly incapable of meeting the enormous expense which a project, such as that of Captain Tulloch's, must of necessity entail. If the people cannot pay for the works, and the State should refuse to defray the cost, it will be necessary to fall back upon some less expensive scheme for ridding the thickly-populated parts of the town of waste water, and to devise more

efficient means for carrying out a proper plan of house and street conservancy, so as to ensure, as far as possible, that purity of surface soil, without which we can never hope to be freed of the endemic pest, cholera, a pest which flourishes so abundantly in those portions of the town where sanitation has never had a chance of contending against it.

I now come to consider the validity of Captain Tulloch's objections to the removal of the excrementitious products of the population, by the dry method. The objections, in fact, can scarcely be said to exist, and are of no weight whatever, for he admits that he is "entirely in accordance with the advocates of this system," (p. 22) except in the question of expense, which, in one portion of the report, it is attempted to show would be a much greater burden upon the people than the establishment of a complete system of sewerage by water. Now if I can show that there are glaring inconsistencies in Captain Tulloch's statements about the expense of the dry method, and if I can establish that his estimates of cost are based upon wholly fallacious data, it must be conceded that his objections, such as they are, fall to the ground, and that the possibility of establishing a system of dry conservancy is in no degree affected by what Captain Tulloch has advanced.

A terrible stumbling block in Captain Tulloch's way, appears to have been a suggestion of my own for the establishment of public latrines on a more efficient scale than now exists, to be worked by the dry earth method. I have nowhere contended that these public establishments should be resorted to by the whole population. I expressly pointed out (p. 19) that the principles of the dry earth method are excellently adapted for "private establishments;" and (p. 24), "that private families adopting it should be compelled to provide themselves with receptacles for fluid and solid excretions of an approved pattern, to be removed daily by the conservancy establishment." I knew, perhaps better than Captain Tulloch did, that Madras contained a large nomadic population,—that many thousands of the people lived in places which could scarcely be regarded as houses—and that they had no places of resort but the roadsides and latrines set apart for the purpose by the Municipality. My recommendation simply amounted to the making of public provision for this class, numbering perhaps from one-eighth to one-fourth of the population. Captain Tulloch, however, says that the entire "success of the scheme will

depend on a universal use being made of the public latrines," (p. 28) and having, out of the depths of his own consciousness evolved this startling doctrine, he proceeds to denounce the immorality of dry earth conservancy, in the following fashion:—

"Can it be expected that any respectable man will permit his wife or his daughters to leave the privacy of their home—to walk, say 150 yards in dry and wet weather along a public street to a public place *for such a purpose*—to mix there with perfect strangers—and to perform such a duty in their very presence. Yet, if the women as well as the men did not use the privies, what measure of success would attend the introduction of dry conservancy?

"The advocates of this system may point to the fact that the existing public latrines are made use of by women, which is perfectly true: but it is by women of the very lowest classes, and by such of them as have no back-yard or enclosure of any kind to resort to. (Exactly the classes, in fact, for whom I suggested the erection of properly-constructed and well-managed latrines.) "And even these women are driven to the public privies only by the strict supervision of the police. Instead, therefore, of encouraging what every one will admit is a proper sense of decency, dry conservancy proposes to lower all classes to the same degrading level. Surely this is a backward step in civilization. Let it be remembered too, that children and young girls are to be subjected to this public ordeal. To what a state of morality must this lead (p. 28, 29)."

In the face of these highly proper reflections, I may perhaps be permitted to suggest that the class of females, who require "to be driven to the public privies" by the police would, on the whole, be more likely to gain in habits of decency and self-respect by frequenting a well-managed public latrine, than by performing natural functions in public throughfares as Captain Tulloch admits to be now the practice. The very "tall" talk in which Captain Tulloch indulges, with regard to the degradation of respectable women is somewhat beside the question, because nobody that I am aware of, has ever proposed so foolish a thing as the compelling of them to resort to places, designed for a wholly different class. I have quoted the remark as an illustration of the manner in which my antagonist converts mole-hills into mountains, when it suits his purpose so to do.

Having decided to his own mind satisfactorily that every inhabitant of Madras is to use a public latrine, under penalty, Captain Tulloch goes on to make elaborate calculations as to

the number of latrines required for 430,000 people, and the cost of construction and management, and the carting away of excreta, &c. and arrives at the conclusion that the total cost would be 75 lacs of rupees according to what he terms my plan, and 258 lacs of rupees according to the data afforded by some experiments conducted under the direction of the Sanitary Commission. It is scarcely necessary to follow Captain Tulloch in his calculations, because as he has taken figures which are worthless for estimating the expenses of the system, it follows that the results arrived at must be wholly unreliable. I shall examine this subject more fully by and bye, but I wish here to notice how inconsistent Captain Tulloch is with himself. Having shown that dry conservancy is too costly a business for the town, that, in fact, the expense of it would be far beyond the means of the people, were they twenty times as wealthy as they are—he elsewhere (p. 107) says that the cost of removal of the excreta "would really be most trifling." It must be remembered that Captain Tulloch in addition to his house drainage works, proposes a continuation of the present system of removing all solid refuse. In discussing this part of his plan, the difficulties and expense of dry conservancy vanish as if by magic. Lest I should be accused of misrepresentation, let the following quotation speak for itself. (The passages to which I would call attention are italicised by myself, not by Captain Tulloch.)

"For the removal of the ordure I would encourage as much as possible *the system which obtains at present throughout the town, but I would at the same time try to improve it.* The abominable smells in all parts of Madras are not produced, as is generally supposed, by the excreta of the population, but by defective drainage. It is the *refuse water* in the houses and in the streets into which all manner of garbage is thrown to ferment and generate foul gases, that creates the dreadful nuisance complained of.

"What is chiefly required to prevent excreta producing a nuisance, is a constant inspection of the privies in the dwellings. Although the ordure is removed daily, yet the privies themselves are not kept clean; very often there is a stoppage in the channel which carries away the urine, or the ordure is dropped on the bare floor, from which it is impossible to remove it altogether. Now if the Municipal Commissioners would organize a system of inspection and insist upon every house-holder keeping his privy in a wholesome state, he might soon get rid of the soil. *Of course the use of clay, ashes, &c. should be encouraged as much as possible.*

"*This would be nothing more than the dry system applied to dwellings, and would have this advantage, that each house-holder would be saddled with no more than the expense of removing the nuisance produced in his own house and by his own family. The cost of this plan to the Municipality would really be most trifling.* (p. 107)."

I leave to Captain Tulloch the task of reconciling his original statements of the cost of dry conservancy and the admission as above that the cost to the Municipality would really be most "trifling." The only difference I find between Captain Tulloch's proposition and my own is, that he would allow the urine to fall into the sewers, whereas I suggested that it should be removed for conversion into manure with no admixture of water. With all deference to Captain Tulloch's arithmetical ability, I cannot quite see how the removal of the excreta from public latrines should cost 75 lacs of rupees, while the collection of the same from each individual house would be but a mere trifle.

He repeatedly ridicules my suggestion that the rate-payers would do well to enquire "whether for the expenditure of one-twentieth part of the cost of the proposed drainage works, Madras might not be made a model of cleanliness and its excreta so valuable, that the cost of collection should be a mere trifle in the Municipal expenditure," and yet in the passage I have quoted, Captain Tulloch makes the damaging admission that dry conservancy might be applied to the town at a "most trifling" cost !!

The necessity of a systematic inspection of privies in private houses was pointed out by me some years before Captain Tulloch's report appeared, but as will be seen from the foot-note appended, Government distinctly declined to sanction the proposition made by me, to effect this desirable object.*

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* "The Municipal Act further empowers the Commissioners to punish by fine all instances of neglect to remove filth (Sections 40 and 41) from houses or grounds, when such may be offensive or injurious to health, but the machinery for carrying out this authority would appear to be defective. It always must be so until Health Inspectors are appointed, and armed with authority to inspect the *interior* of native dwellings. It is impossible to certify to the cleanliness of any native house from a simple observation of its exterior, while the elements of disease and death may be rife within, but studiously concealed from view.

"These remarks apply especially to the prevention of Cholera, a disease which, for many years past, has been fearfully destructive of life in the city of Madras. With the example before us of what has been done in the way of *keeping out* Cholera from the European Barracks in the Fort, since 1859, there

Captain Tulloch's estimates of cost of a system of dry conservancy, as proposed by myself, are all based on assumptions of his own, in every one of which there lurks a fallacy.

He begins by assuming that every member of the population must resort to a public latrine or public urinal, then that a latrine of given dimensions must necessarily cost a certain sum. Then he assumes that 645 public urinals, distinct from latrines, would be wanted, each to cost Rs. 400. Then that a certain amount of space would require to be taken up for building all these latrines and urinals, and that the land which he has valued for the whole town at Rs. 250 "per ground" would cost more than five lacs of rupees. Then as regards the actual carting in of earth and removal of excreta, it is assumed that bullock labour and country carts are the most economical means of removal, and that, with all our boasted skill in the adaptation of mechanical means to the requirements of civilization, we are to be content with a pair of bullocks drawing "a load of half a ton." In this way, and by a questionable process of "capitalizing" the annual expenditure for labour and bullocks, Captain Tulloch has arrived at the grand result that my scheme of dry conservancy would cost 75 lacs of rupees. This too while he states that the removal of all the solid excreta from house to house would be but a mere trifle to the Municipality. The whole of these calculations may be regarded as an abuse of figures, and it is unfortunate for Captain Tulloch that in recommending his own scheme, he should have condemned his own estimates regarding dry conservancy, by admitting that the removal of the solid refuse would be a "most trifling cost" to the Municipality.

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need be no hesitation in trying to accomplish a similar work for the denser parts of the town. The example is sufficiently encouraging to warrant any reasonable expenditure having for its object a pure water supply and improved drainage, plenty of fresh air in streets and houses, and simple and efficient means for keeping the town free from fœcal filth.—*Mortuary Report for* 1861.

"The attention of the Municipal Commissioners will be drawn to the suggestion made in the first part of paragraph 12, which seems one that may easily be carried out and is likely to have good effect; but the Government are not prepared to sanction Dr. Cornish's proposal to authorize the inspection for sanitary purposes of the interior of private dwellings.

"The occupants of houses who, by any act or omission, create or allow to arise within their premises any thing that becomes a nuisance to others or the public, are of course liable to inspection and, it may be, punishment; but an organized inspection of private houses by public officials would, even if practicable, be open to much abuse."—*Extract from Government order thereon*, 1863.

With regard to the figures in the report of the Sanitary Commission, and the experiments in earth conservancy at the General Hospital, to which Captain Tulloch alludes as giving him the data for an estimate of 258 lacs of rupees, (pp. 40 and 41) I have only to say that I do not hold myself responsible for the one or the other, and that subsequent experience in other places has demonstrated the utter worthlessness of the experiments, in regard to the question of cost.

Actual facts in regard to this question of expense are worth more than all the theories in the world. Let us hear what a gentleman who has actually carried out the earth system of conservancy for a large Military cantonment, thickly crowded by native bazaars, has to say on this point, and let the reader carefully contrast this gentleman's practical experience with Captain Tulloch's theoretical objections.

MEMORANDUM

On the Native latrine system, as carried out at Morar, Gwalior, forwarded to the Adjutant General, in obedience to his No. 5300 *of the* 25*th July* 1866.

1. The station of Morar, surrounded as it is by large villages, and having large bazaars in its centre, and moreover being intersected in every direction by ravines, which were the resort of every native for the purposes of nature became so offensive, that it was absolutely necessary to adopt remedial measures.

2. The following course was initiated, and found to work well.

3. A tax of one Anna a head is collected from all native adults (male and female), resident within Cantonment boundaries, and from all children above ten.

4. Quarter Masters of Regiments collect from all natives in their lines, including Regimental bazaars, and forward to Cantonment Magistrate. This latter Officer through a Moonshee (who receives eight per cent. on collections for his trouble) collects from Sudder bazaar, and all natives not living in Regimental lines, and keeps the accounts of the whole fund.

5. All collections are ordered to be paid in on the 20th of the month for the preceding one.

6. Small private latrines are allowed in compounds of Officers (for servants) and also in compounds of rich natives in bazaars on payment of a fee of 4 Annas per head, by special permission—the

occupants of the house building the latrine, and the conservancy being carried out by the station establishment.

7. The whole of the working of the establishment, payment of of them, &c. &c. rests with the Cantonment Magistrate and his subordinates, but Quarter Masters are held responsible for the latrines in their lines, and correspond direct with the Cantonment Magistrate on the subject. The Conservancy Serjeant is under the Cantonment Magistrate and his Principal Assistant in the scheme.

8. Every Native within the Cantonment pillars is compelled to pay this tax, with the exception of the Native Regiments, who are invited to do it voluntarily; and in this district, they all, without any exception, prefer paying the one Anna for the convenience of having latrines in their lines, to the great inconvenience of having to go beyond Cantonment boundaries for the purposes of nature.

9. The female latrines are separate from the men's, and it is generally found that two mehters with their wives, on a total monthly pay of 14 Rupees, are sufficient to keep clean a latrine used by 2,000 people.

10. The system carried out in these latrines is the exact counterpart of the one existing with British Regiments.

11. The filth is deodorized with dry earth kept in a shed attached to the latrine (the carts on return from the pits bringing the same). It is kept in receptacles and carried away in filth carts to the pits.

12. The carts are supplied by Government, the receptacles, privy pans, &c. &c. are kept up and purchased from the proceeds of the fund, the utensils used being exactly of the same pattern as those employed in British Regimental lines.

13. The cost for the erection of a latrine varies necessarily according to its size—the largest one in use here is 167 by 20 feet, cost about 250 Rupees.

14. The total cost for the erection of latrines, purchase of receptacles, privy pans, and bullocks at this station, amounted to about Rupees 7,000, which sum has been advanced from local funds.

15. The monthly excess of income over expenditure averages 180 Rupees; but from this, the repairs of conservancy utensils and latrines, and the wear and tear of bullocks has to be defrayed.

16. It will be seen that the only assistance that Government affords to the latrine system for natives, is the use of its carts; every other expense incurred being paid out of the latrine fund. This fund has now been incorporated with the grazing fund, in

accordance with a communication received from the Quarter Master General, that in the new Cantonment Regulations about to be published by Government, the native latrine system will be made compulsory.

(Signed) H. TOMBS, Brigadier General,

Comdg. Gwalior District.

Dy. Asst. Qr. Mr. Genl.'s Office,
Gwalior District, Head Quarters,
Morar, 11*th August* 1866.

In communicating this "memorandum" to the Madras Government, the Governor General in Council caused the following observations to be made for the consideration of our local authorities:—

"With reference to the memorandum from your office, No. 2199, dated 27th June 1866, I am directed to forward, for communication to the Right Honorable the Governor in Council, the accompanying memorandum on the conservancy system, which was introduced by Brigadier General Tombs, C.B. and V.C., at Morar, and which has been attended with such remarkable success as to call forth a special expression of His Excellency the Commander-in-Chief's approval.

"Without insisting on this plan being followed out in all its details, the Government of India cannot but think that if zeal, energy and judgment, similar to that shewn by Brigadier-General Tombs, be shewn by Officers Commanding Madras Troops, a somewhat similar result might be fairly anticipated."

It may be noted that in one portion of the arrangement, General Tombs' system of carrying out the dry earth method is needlessly costly, *i. e.* the use of pans of the same pattern as those for European troops; experience has shown that in a properly-constructed latrine, these are not wanted for natives.

But the experience attained is not a little remarkable. For seven thousand rupees he is able to build public latrines sufficient for the accommodation of a population of 56,000 people. In this calculation I have taken the cost of the large latrine, sufficient for two thousand people, at Rupees 250. The grand result is, that the special local taxation for conservancy purposes has produced an income (apparently collected without trouble,) not only sufficient for the maintenance of the scavenging establishment, but which has yielded a surplus, capable of paying a good interest on the money laid out in building the latrines, and to compensate for wear and tear of plant and establishment.

Nothing is said about the sale of manure, although in process of time, the revenue under this head ought to amount to no inconsiderable item.

Well may the Government of India remark, that if "zeal, energy, and judgment" similar to that shown by Brigadier General Tombs were a little more general on this side of India, "somewhat similar results might be fairly anticipated."

The Bengal Sanitary Commission, in its report for 1865, says of the dry earth conservancy, that "there is almost a complete concurrence of opinion" among the officers who have tried it in the tract of country "between Peshawur and Singapore," that its success *when properly managed*, "has been most remarkable."

Mr. Gover of the Military Male Asylum, Madras, (the only gentleman in Madras, who, of my own knowledge, has brought a cultivated intelligence to bear upon the practical application of the system) has reported, in the most unqualified terms, the complete success of the system in the extensive establishment over which he presides.

Not only has it been carried out without increase of cost, but an actual saving of about twenty rupees a month in conservancy establishment has been effected.

The Madras Sanitary Commission says that it is "impossi-"ble to suppose that similar measures could not be "followed by similar results in the army," and when in this Presidency we can get the wheels of official routine to turn a little faster, so as to carry us beyond the region of experiment, in the mud of which we have been sticking for the past three years, it is not unlikely that General Tombs' example may teach others in authority that the introduction of the dry earth system in our towns, cantonments, and villages, is not only practicable as regards the question of expense, but that it affords the only really feasible means of enabling Government to grapple with the difficulty of effecting any real sanitary improvement in the condition of the population generally. Although Captain Tulloch may still adhere to the maxim that there is "nothing like water" for the removal of sewage, this much can be said in proof of the advance made in the modern principles of conservancy, that there are other Engineers in India who, not having committed themselves to positive

opinions, are free to acknowledge the many advantages of the dry method, and to set themselves to work with a will to improve and simplify the means of reducing theory to practice. While I write, I have lying before me a scheme proposed by Mr. Bruce, the Municipal Engineer of Lucknow, for the cleansing of that large and thickly-populated town, in which he sets himself to the task of dealing with the excreta of the population in the only way that, in my opinion, it ever ought to be dealt with in India. This gentleman does not conjure up impossible difficulties. The details of his scheme may be open to criticism, and his estimates of the value of manure may be fixed too high, but there can be no doubt that he has grasped the spirit of sound conservancy principles, and that he designs seriously to apply them in practice.

The outline of his scheme, as given in the proceedings of the Bengal Sanitary Commission for December 1866, may not be destitute of interest at the present time, when public opinion is gradually coming round to the view that somewhat similar measures are suitable to the condition of Madras and its people.

"A scheme for a proper system of drainage conservancy in the city of Lucknow has been drawn up by Mr. Bruce, the Municipal Engineer. From his memorandum on this subject, it appears that from the elevated position of the town with reference to the River Goomtee, no natural difficulties have to be contended with. Were the present channels properly cleaned out, and all the obstructions which have gradually grown up removed, the whole city would be kept dry even in the heaviest rains. For drainage, therefore, Mr. Bruce recommends that all the main open nullahs should be opened out, by cleaning out all the filth which has accumulated in them, by pulling down and re-constructing the bridges that are of insufficient water-way, by removing such houses as have encroached on the nullahs and obstructed their channel, and by re-laying their beds and building falls wherever these may be required. As regards the great mass of the deep drains which run through the city, he would have saucer-drains in their place. Surveys and levels have already been completed to show how these recommendations can be carried out. With respect to conservancy, Mr. Bruce estimates that, taking the population at 2,00,000, there will be a daily quantity of 7,500 maunds of sewage, &c. to be removed. He obtains these figures by allowing one pound of soil and two pounds of sweepings per head. In order to remove this large quantity of refuse, he proposes to have a number of depôts within the city at which it should be collected. The soil and sweepings of private houses are at present removed by Mehters, who receive

remuneration according to the means of the classes by whom they are employed, their wages in many instances amounting to only a a few chupatties or seers of rice per mensem. Mr. Bruce proposes that these men, who are spoken of as amounting to from 1,000 to 1,500 in number, should be engaged by the Municipality and receive regular wages. One thousand paid Sweepers at Rs. 4 a month would, he believes, be fully equal to what is to be done, and this would fall as a tax of 3·84 pie on each inhabitant.

"At present only a small portion of the filth is removed outside the city. The practice is to throw it into the nearest nullah or other excavation, the only exception apparently being so much as is taken by the contractors for brick-makers and cultivators, which is estimated at not more than 1,500 maunds daily, and that only during eight months of the year. In the rains none is removed, except so much as is washed down the main outlets. As the most effectual and economical mode of removing the enormous mass of refuse daily, Mr. Bruce proposes tramways worked by ponies. To complete this system would require 22 miles of tramway, but if only the main lines leading from the depôts were laid down, the length would be considerably diminished. For the reception of the soil at each depôt, he proposes there should be 20 air-tight receptacles, of which, in order to provide a double set, 4,000 would in all be required. Every morning 2,000 of these vessels would be ready for removal, and would require 200 trucks containing 10 receptacles each. For the sweepings 200 extra trucks would be requisite, so that in all 400 would be required. Each pony would drag four trucks, or a weight of 4 tons. The total original outlay would be—

		Rs.
15 miles of tramway @ Rs. 16,000.....	=	2,40,000
400 trucks @ Rs. 200.....	=	80,000
4,000 receptacles @ Rs 8.....	=	32,000
Or a total of...		3,52,000

"As regards the final disposal of all the soil, &c., Mr. Bruce is of opinion that it might ultimately be sold; if it were to fetch Rs. 2 per 100 maunds, the result would be an income of Rs. 36,000 annually. The cost of the working establishment he estimates at Rs. 18,660 per annum, leaving a balance of Rs. 17,340.

"In order to cleanse the main drains which, however, are on no account to contain sewage, Mr. Bruce further proposes that a pumping engine should be erected. The cost would, he believes, be Rs. 1,00,000. By this means also a supply of water could be given to the inhabitants.

"Mr. Bruce's scheme is, no doubt, well worthy of consideration. The expenditure proposed is large, but the conservancy of an immense city like Lucknow, cannot be carried out without expense. At a comparative small outlay it might be experimentally tried in one quarter of the town."

Captain Tulloch in torturing an expression of mine to suit his own views, makes me say "adopt dry conservancy "and Madras will become a model of cleanliness for 2½ lacs "of Rupees." Now it is scarcely necessary to repeat here what I have said elsewhere, that I never wrote anything that would bear such construction, and that I never made, what Captain Tulloch calls, an "estimate" of the cost of applying the system to the town of Madras.

When I hinted at the possibility of cleaning Madras for less than half a million of pounds sterling, I suggested that it would be worth careful enquiry, whether for an expenditure of a twentieth part of the money it might not be possible to keep the town clean, especially of the most dangerous refuse, human excreta. The twentieth part of half a million of pounds is certainly two and a half lacs of rupees, and Captain Tulloch is entitled to any advantage which this fact may give, but when he converts a simple suggestion into a positive statement, and gives the latter the appearance of an actual quotation from my pamphlet, he wanders beyond the bounds of fair criticism, and lays himself open to the charge of deliberate misrepresentation of the passage in question. As it turns out, and as I have already shown, Captain Tulloch's "estimate" of the cost of applying the dry method of conservancy to the town, is not very different from my own. Both are no doubt vague and indicative only of moderate outlay. I suggest that the expense may be made a "mere trifle" in Municipal expenditure. Captain Tulloch admits that the cost of all essentials of the scheme "to the Muncipality would really be most trifling." The difference therefore is only that which may be imagined to exist between a "mere trifle" and a "most trifling" cost.

Captain Tulloch, or some other engineer who has given the subject careful attention, would be doing a good service to the Municipality by showing, on somewhat reliable data, the proportion of the town population for which public latrine accommodation is required—as also the most economical method of constructing the buildings and of removing from the town the substances which are most dangerous to the health

of the people. Surely in the latter part of the nineteenth century, a country cart and a pair of bullocks, moving at the rate of two and half miles an hour, and removing half a ton of refuse in each journey, cannot be the most economical procedure, when the daily refuse is estimated at 860 tons. Street railways or tramways have been advocated on other grounds, as likely to be remunerative in Madras.* By such means, or by completing the junction of the north and south canals, the town rubbish might certainly be more economically transported than it is at present, and one of the grave difficulties of establishing the dry method—that of disposing of the rubbish—would be made to disappear. The present mode of scavengering costs a good deal of money, and is by no means perfect; the refuse of a large number of the people is not removed at all by the conservancy establishment, but with all the admitted defects of the present system, and the worse than useless attempts at street drainage, there can be no doubt that the town of Madras is kept more free of fecal pollution, than are the towns and villages in the district, where not even the semblance of decency and method in conservancy is attempted.

It will be no doubt a matter of surprise to some people to hear that the town population is better protected from cholera than the country districts, yet this appears to be the case, and is just what might be expected, if we admit that the liability to cholera is increased by neglecting to dispose in a proper way of the excrementitious matters of the population. During 1866, when cholera prevailed in almost every part of Southern India, it is interesting to note that the incidence of the epidemic fell with greater severity upon the scattered inhabitants of the Madras district, than upon the crowded communities within the limits of the town. The

* At the present time, when exertions are being made to obtain Parliamentary powers for the introduction of street railways into the metropolis, it is interesting to consider what has been done on the other side of the Atlantic in connection with the same movement. In the year 1863 a Commission was appointed by the Legislature of Massachussets to investigate the street railway system of that State. After hearing a large number of witnesses, the Commission reported, in January 1865, as follows:—'From the testimony before us, and from all we know or can learn in regard to street railways, we entertain no doubt they must be regarded as an indispensable necessity, the call for which will be likely to increase rather than diminish in the future; and that, if properly managed, they may be made remunerative at very low rates of fare.'—*Sunday Gazette.*

Note to line 5, page 242.

We have been requested to state that the quantity of refuse to be removed daily from Madras is considerably overstated. We are not aware whence Mr. Cornish obtained his information, but we have been told on the authority of Colonel Denison, that the amount is 231 and not 860 tons.—Ed. *M.Q.J.*

death registration reports for the Madras town and collectorate are as follows :—

	Assumed Population.	Deaths.	Cholera.
Town.....	430,000	... 13,881	... 2,984
Collectorate.....	664,900	... 22,869	... 9,294

Proportion of deaths to population in the district 34·3 per thousand.

Do do from cholera ..... 13·9 ,,
Proportion of deaths to population in the town, 32·2 ,,
Do do from cholera ..... 6·9 ,,

Here then are important facts, which we shall do well to ponder over, in connection with public conservancy. The inhabitants of a town in which scavengering is carried out, after a fashion, but not so completely as is desirable, die at the rate of 6·9 per thousand, during a Cholera epidemic, while the people of the adjacent district, whose small towns and villages are never cleaned at all, perish in the larger ratio of 13·9 per thousand from the pest during the same period. The logical inference from these figures is, that if Government is to spend any money at all in attempts to better the sanitary condition of the people, it should begin with that portion of the population which feels the incidence of epidemic visitations most acutely, and not with the town populations that are able, in a measure, to help themselves in bettering their own Sanitary condition.

I have seen a statement in the public papers to the effect that Captain Tulloch has been permitted to proceed to England with the view of examining the details of important drainage works in that country. From what has been already said as to the important question of temperature, I am afraid that British experience will not help us in solving the difficulty of disposing of our town refuse in India.

The physical conditions of the two countries differ so widely, that what may be regarded as a model system of drainage in the one country, may prove a complete failure in the other. But although I do not anticipate any advantage from a strict following of British models, I have not the least doubt but that Captain Tulloch might derive much valuable information, by visiting some of those countries, which, as regards temperature and climate, are more closely allied to India than to England. I have no records at hand to show how the people in New Orleans, San Francisco,

and other places in warm latitudes dispose of their sewage, but I think it quite within the bounds of possibility that an intelligent officer visiting the chief cities in America and Australia, would be able to pick up some valuable hints for guidance, in reference to the cleansing of Indian towns. In Australia, I have reason to know that the system of earth sewage is making considerable progress, and that its general application has been discussed by the Victorian Parliament. A Government "blue book," has been published in Melbourne bearing upon this question, though I regret to say I have been unable to procure a copy of it, so as to give any account of the conclusions come to. The following paragraph, however, from a late number of the *Melbourne Age*, will show what the local Board of Health thinks of the respective merits of "wet" and "dry" conservancy.

"The report of the Victorian Central Board of Health for 1865, has been placed before the Legislature. It deals mainly with those evils affecting the public safety which unfortunately still exist, and which may result in a national calamity if not checked by the adoption of a comprehensive public health act. The report deals at considerable length with the water-closet and cesspool question, advocating the substitution of earth closets as the only one adequate remedy for the abominations of the present system."

The progress made by our energetic Australian neighbours, while we in India have been only thinking and experimenting, is such as may well cause us to hide our heads with shame.

Every Newspaper from the colonies that reaches me, contains amongst its advertisments, some thing to the following effect.

EARTH CLOSETS.

DRAPER AND SON'S

Are the best and cheapest Self-acting Closets made.
From £3 and upwards.
Factory; 83 Bourke-street west, next St. Patrick's Hall.
Earth supplied and cleaned at moderate rate.

FRASER'S IMPROVED PATENT EARTH CLOSET

cannot be surpassed in Simplicity, Durability and Regularity of Action. The best and cheapest ever invented. Inspection invited at the factory, 174 Lonsdale-street east.

Earth supplied and closets cleaned for a trifling annual charge.

One firm, I see, notify that upwards of 400 of their "earth closets" have been sold in Melbourne during the past year; and the system would now appear to be commonly establish-

ed in that town. With the fact before us that a young and wealthy town like Melbourne, should be seriously considering the best means of carrying out a system of dry earth conservancy, we may surely well pause here and enquire whether a modification of the system is not better suited to the requirements of a tropical climate, than the water system, which so many otherwise well informed people, still maintain to be the one thing needful for the purification of our town.

As regards the experiments which have been made in this Presidency to introduce dry earth conservancy, it would be easy to record, and to account for, a long list of failures.

The Honorable Mr. Ellis, C.B., Sanitary Commissioner, in an able memorandum on the subject lately submitted to Government, sums up the whole question very clearly in the following words :—

"The absolute success of the dry earth system is evidenced by "the Male Military Orphan Asylum, where, under the careful super- "vision of the Principal, Mr. Gover, the new conservancy has "answered admirably, and with only a trifling increase of expense.

"Judged by this institution, it would be easy to report to the "Government of India that the system is an entire success. Judged "by the experiments in the Fort, it would be necessary to state that "the system is a failure." *(Dated 27th March* 1867.*)*

From this we may understand that failures, when they do occur, are not the result of faulty principles, but of errors or defects in the method of applying the principles. This I believe will be found to be the truth in every instance in which the earth system has failed to effect the object expected of it.

I cannot close this paper without briefly alluding to the progress already made in India, in the understanding of the principles of dry conservancy. When I wrote my pamphlet "On the Cleansing of Towns," I was not aware that Dr. Charles Hathaway had actually carried out in the Punjaub, the plan of separating the fluid and solid excretions, but such I have subsequently ascertained was an essential feature of the "dry system" which he so successfully introduced in all the jails of the province. I made the suggestion for separately collecting feces and urine in ignorance of what that officer had already successfully accomplished, and I made it with a special motive, viz., to diminish to the utmost the quantity of earth to be carted to and fro. Now the practical

difficulty in earth sewage is the cost of moving earth, and it follows that if the quantity can be reduced by one half or two-thirds, that the expenses of the system must be reduced very much in proportion. The Madras Sanitary Commission of 1864, considered the suggestion of mine in regard to separate collection to be unimportant, but it subsequently changed its mind, (1865) and devised a plan to secure effectual separation of fluids and solids. Now I regard this as an all-important question, and particularly in the management of public latrines, and I think that the experience already acquired in Bengal is conclusive in favour of the practice both on the score of efficiency and economy. Before the introduction of earth sewage, the system was clearly understood and practically followed in the Punjaub jails. During my late visit to Calcutta, I saw it in practical operation at the Alipore jail, an institution containing 1,500 prisoners, and where, thanks to the admirable management of my friend Dr. Faucus, not a trace of evil odour could be detected in the privies designed by him to effect the separation of the urine and feces. In Dr. Faucus' privy the arrangements are so simple, and yet so effective, that however stupid and obstinate the people may be, they cannot misuse it. In this establishment the urine is at once applied to grass land, generally diluted with water. It occasions no offence. The fecal refuse mixed with earth is covered up in trenches in the garden, and allowed to remain undisturbed for about two months, when the soil is turned over and cultivated. With regard to the economy in labour of such a separation, the following note, addressed to myself by a gentleman who had followed the instructions laid down in my pamphlet, will sufficiently testify :—

Nellore, *April* 19*th*, 1865.

My dear Cornish,—I should before have communicated to you the result of the experiment I made in this jail, of the privy you recommend in your first pamphlet. But lately I have been so much pressed for time, and my Dressers' hands have been kept so full during the late epidemic which we have had, that it has been altogether out of my power to manage it earlier. And being about to leave the station, I must, before doing so, communicate to you the trial we have made here of the style of privy you propose.

I cannot more fully do so than by sending you a copy of letter I sent to Mr. Story, lately officer in charge here, in which I asked the extension of the principle throughout all the privies in the jail, cells, and hospital. The privy I made is the cleanest in the whole

prison, and perfectly free from all disagreeable odours. It is used only during the day, and is common to all the prisoners confined in the old jail, where sometimes the number detained reaches a very high figure. Complete separation of fluid from solid excreta is with ease effected; the nullahed floor invites the sitters to drop their urine there, and it is equally easy for those frequenting the privy to do the washing part of the operation, apart from where the solid excreta have fallen. Outside there is also a total absence of all noxious smells, and so cleanly can the place be kept, that there is no necessity for the objectionable flushing, which can only hasten decomposition of the feces, and besides wash out to the nullahs on each side what seems so perceptibly to contaminate the air around the jail, and it may be also in the hot weather, the wells of the prison. The economy of labour, further, strongly recommends the adoption of the principle, for when by the present system of mixing fluids and solids together, the gang of toties we have require to make five trips daily, a distance of two miles, to remove all the night soil of the jail, dropped in the thirty tubs, scarcely more than one trip, should your plan be adopted, need be made, and more time and more hands can be commanded for carrying out thorough cleanliness. The privies can all be kept perfectly dry, and being so, there is an entire absence of smell both inside and out. I have asked almost every one in the station to examine the one I made, and all have been equally astonished at the result, and satisfied with the completeness of the principle. You might have an opportunity of seeing Mr. Story at Madras before his departure by the next steamer, and he is able to bear out fully all I have said regarding it. If extended here, it will cost little or nothing. A ton and a half of asphalte, about seventy parahs of lime, and a few bandy loads of firewood, are all that will require the outlay of money, in addition to new buckets. Laterite stones can be cut by the prisoners, and I think the whole can be done for Rupees 500,—cheap enough surely for fifteen privies.

Yours truly,
HUNTER ADAM.

The Earth closets which have been already invented do not, so far as I am aware, make any provision for the separate collection of fluids and solids. This perhaps is not of so much importance in private houses, where they can be frequently cleaned, but in public latrines. I think the separation should be invariably attempted There is no insuperable difficulty in the matter, if we adopt methods which leave nothing to the control of the people who frequent these places, and the labour of keeping the latrines clean would be very considerably diminished.

In my pamphlet (page 20), I suggested the use of earth for the absorption and dryage of urine as a temporary expedient only, and added, "that in a country where salt is "manufactured on a grand scale out of sea water, by simple "evaporation, I do not despair of seeing measures adopted "to concentrate urine for the farmers use, without the inter-"vention of any drying material."

From frequent consideration of this subject, I am inclined to think that the suggestion offers a practicable means of disposing of the fluid excreta in those parts of India, where the dryness of the atmosphere allows of rapid evaporation. The urine might be collected and retained in cisterns, sulphuric acid being added to fix the ammonia, as it became disengaged, and carbolic acid to retard decomposition. In fine weather the urine might be pumped into shallow evaporating basins, constructed of well rammed clay, and in shape like salt pans. The semi-solid matters left by evaporation might be rapidly dried, and converted into portable manure by mixing with them a very small quantity of highly dried clay in powder. The Sanitary conference of Constantinople, have already recommended in regard to the places of deposit of excreta, that manufactories of manure should be established in connection therewith. In these places I would endeavour to save as much as possible of the valuable constituents of urine, by the process I have just hinted at.

Then again by effecting a separation in the two excretions, it is quite possible for private establishments to do without the use of earth. The ashes from the cooking places would usually be ample in quantity for the drying and removal of fecal deposits, and in this way an enormous saving in carriage might be effected. As a manure the mixture of ashes and fecal matter, will always be more valuable than earth and fecal matter, in the shape of poudrette.

Lastly, there remains to be considered the great difference in the quality of soils, as regard their power of converting decaying organic matter into harmless mould. The experiments made by Dr. Faucus, of the Bengal Medical Service would seem to establish that the peculiar property which earth possesses in this respect, is due to the amount of organic matter, or *humus* already in the soil. This gentleman found, that pure clay, or "soorkie," (brick dust) did not possess anything like the absorbing or converting power, that was effected by soils

highly charged with organic matter. This result was unlooked for, but it showed that the Revd. Mr. Moule was quite right in asserting that earth might be used over and over again for the reception of fecal matter, and that its power of deodorization was in no degree lost by frequent use. The practical lesson from Dr. Faucus' experiments is, that the poudrette which has been once used, may, after thorough mixing and dryage, be stored for subsequent use, and with increased power as a deodorizer. By repeated usage only can the poudrette be made so valuable as a manure, that people will care to buy it and be at the expense of carting it away.

The too lavish use of earth is the one great mistake that is being made in India, in regard to the new system of conservancy. Every effort must be made to reduce the quantity of soil, and to make a supply serve for more than one occasion. Let it be always remembered that healthy feces contain about 75 per cent. of water—that supposing soil and fresh feces to be mixed together in equal proportions, the quantity of the latter, when dry, will be only as one to four of the former. By using three or five pounds of earth for each person, the proportion of the fertilizing agent becomes so small that no great advantage can be expected from using poudrette of this strength for manure. The object should be, not so much the rapid destruction of bad odour, which is effected by using large quantities of earth, as the slow conversion of fecal matter into a rich fertilizing mould. In a town like Madras there should be at least a dozen manure factories, in which the excreta of the people might be scientifically dealt with, preparatory to its sale to the cultivators. If this thing is worth doing at all, it is worth doing well. Mechanical skill and the adaptation of scientific principles to the object in view, will alone help us in dealing with the difficulties of the dry system.

Is it too much to ask of our Engineers and Mechanicians that they will devise an economical system of collection and removal of town refuse, and of Sanitarians that they will agree upon and lay down the principles that should be adhered to, in carrying out a measure so important in regard to public health?

ART. XIII.—*Note on the use of the Compound Tincture of Benzoin in Chronic Dysentery and in Mucous Diarrhœa.* By W. N. CHIPPERFIELD, Surgeon, Acting Physician, General Hospital, Madras.

(Communicated by the Inspector-General, Indian Medical Department.)

HAVING had considerable experience during the last ten years in the use of the *Compound Tincture of Benzoin* in certain affections of the mucous membrane of the intestines, I am anxious to call attention to the success attendant upon the administration of this remedy in suitable cases. In doing so, I am quite aware that I am not proposing anything like an original application of this medicine, but rather a revival of the use of the once much celebrated *Friar's Balsam.* I believe that this preparation has almost entirely fallen into disuse as an internal remedy, except in cases of chronic bronchitis with profuse mucopurulent expectoration, in which cases it is generally held of a value second, perhaps, to that of Ammoniacum, Venice Turpentine, Copaiba, and the like.

In Vol. IX of this Journal I published some cases which sufficiently indicate the forms and stages of *Acute Dysentery* in which I have found the Compound Tincture of Benzoin useful, and the mode in which it is administered ; but the cases alluded to give but slight indications of its value in those cases, in which, as it appears to me, its use is particularly to be advocated.

In sthenic acute dysentery large doses of Ipecacuan, with suitable topical applications, generally effect a complete cure, but in complicated cases the action of this valuable drug requires to be supplemented by other remedies. In sub-acute, asthenic and scorbutic cases, though a few large doses of Ipecacuan may prove of great benefit, yet alone they will not effect a cure ; and in cases of long standing chronic dysentery, the use of Ipecacuan is absolutely confined to those instances in which some acute or sub-acute action becomes implanted upon the existing chronic disease.

I may as well at once mention the forms of mucous membrane affection in which I use the Benzoin ; but it must be understood that I am not writing upon the general treat-

ment of dysentery, nor do I intend to enter at all upon the pathology of the affections for the treatment of which I advocate the use of the compound Benzoin tincture ; this paper is far less pretentious, being simply a note on the employment of this remedy. I shall content myself, therefore, with pointing out the more obvious objective symptoms, and especially the appearance of the evacuations, which guide me in exhibiting the Benzoin, and the mode of application which considerable experience has led me to adopt.

1. In sub-acute and asthenic cases, when all signs of activity have passed off ; when febrile action, if ever present, has entirely ceased ; when there is no longer anything like hæmorrhage from the bowel, but the blood that is passed is very small in quantity and mixed with a considerable amount of glairy or opaque mucoid exudation, or perhaps with a small amount of pus ; and when the discharges, which may be small and frequent and attended by some tenesmus, consist chiefly of semi-fluid feculence mixed with the materials just mentioned, or with broken-up shreddy masses of ulcerated mucous tissue.

2. In cases of chronic dysentery, when the stools consist of frothy feculent matter of a pasty consistence, containing much air, and of various shades of yellow, green and brown, and intimately mixed up with a quantity of mucoid exudation ; sometimes exhibiting separate small masses of opaque or transparent glairy slimy substance, streaked with blood ; sometimes containing a little purulent matter. If they are copious, there may be only three or four such stools passed in the twenty-four hours ; but if they are scanty, they may be numerous and cause great distress to the patient from loss of rest, and from irritating the anus and lower part of the rectum. In cases of long continuance the patient endeavours to restrain the evacuations, and when he is off his guard they will pass suddenly and with some force, causing much discomfort.

3. In simple mucous diarrhœa (catarrh of the intestinal membrane), with or without febrility, when there are griping pains in the abdomen with a sensation of tearing when at stool ; the evacuations frequent or infrequent, but of very varying character, generally semi-consistent, sizey, of ochry brown colour ; sometimes preceded, sometimes followed, by a ball of glairy mucus as large as a pigeon's egg ; often consisting of small scybalous masses, each mass enve-

loped by a layer of clear mucus; never containing any blood.

4. In somewhat rare cases:—when a patient, after having suffered for some time from chronic diarrhœa, is affected with more or less constipation, the stools being solid, of natural form or somewhat scybalous, and accompanied with, or followed by, shrivelled, semi-transparent, membrane-like masses, looking like a congeries of ruptured thin cysts (evidently casts of the crypts of the colon).

5. In cases of the chronic form of infantile inflammatory diarrhœa, the evacuations always containing mucus, sometimes a little blood, with small masses of precipitated undigested casein, and a quantity of sizey matter of various shades of green; the odour very various, sometimes feculent, but more often sour or faintly acid. This diarrhœa is sometimes the result of reflex irritation during the pressure of a rising tooth against the dentinal membrane and gum, when lancing the gum will give relief; but very frequently it occurs during the final calcification of the dental pulp long before there is any pressure from the tooth, and then, as Dr. West says, "it would be a cruel and useless piece of empiricism to subject the child to the distress of the operation," although it is often done. But the flux may occur before dentition takes place; and, again, it may happen after the completion of the first dentition; in other words, it may be quite independent of irritation from teething.

Under the circumstances outlined above, I have found very great relief from the internal administration of the compound tincture of Benzoin, either by mouth or rectum. The formulæ I generally use, are the following:—

FOR ADULTS.

℞. Pulvis Acaciæ, gr. 30.
Tinct. Benzoin. Comp. f. ʒi.—f. ʒii.
„ Opii ♏xx.—♏xl.
Aquæ fontanæ vel Carui. ad f. ℥vi.—Misce fiat mistura.

A fourth part every four hours.

FOR INFANTS AND CHILDREN.

℞. Tinct. Benzoini Comp. f. ʒi.
Vini Ipecacuanhæ, f. ʒi.
Syrupi, f. ℥ss.
Aquæ font. ad. ℥iiss.—Misce fiat mistura.

From one to three teaspoonfuls every two, three or four hours.

Should the stools be frequent, very relaxed, but semi-feculent, from f. ʒss. to f. ʒi. of the Compound Tincture of Kino may be added to each dose for adults, and a proportionate quantity for children, or the Infusion of Cusparia or Decoction of Hematoxylon may be used as a vehicle instead of water. If opium be contraindicated, it may be omitted, or if necessary, a proper quantity may be added to the mixture for children.

The exhibition of Benzoin does not in the least interfere with the giving of other remedies when deemed necessary. Thus in asthenic and scorbutic cases, quinine (Liquor Quinæ Amorphous) may be added in any needed quantity to the mixture; or one or two doses may be replaced by a draught containing from ♏xx. to ♏xl. of Liquor Ferri Pernitratis. Lime juice or Bael sherbet may be given with the medicine.

When laxatives are needed to ensure the emptying of the bowel, castor oil, or rhubarb, or jalap may be given in the early morning, the benzoin being continued through the day. From half a grain to a grain of podophyllin, with a grain of opium or half a grain of extract of belladonna, given at bed-time is an adjunct to the benzoin treatment, which I often use with advantage when the liver is inactive. This dose may be given for three or four consecutive nights, or it may only be required once or twice a week. Absence of bile from the stools, an icteric tint of the conjuctiva and the presence of bile pigment in the urine are guides to the exhibition of podophyllin, provided there are no signs of obstruction. The Benzoin mixture may also be alternated with the mineral acids when their use is indicated. In the forms of dysentery, comprised under headings 1 and 2, and in infantile diarrhœa the Benzoin may be usefully administered by rectum as well as by mouth.

The following is a formula for an enema:—

℞. Pulv. Acaciæ, gr. 30.
Tinct. Benzoini Comp. f. ʒii.—ʒiii.
„ Opii, ♏xx.
Aquæ tepidæ, f. ʒiv.—Misce.

ʒss. for an infant, and from half to the whole quantity

for an adult, to be injected whilst milk warm once, twice, or thrice a day.

An adult will seldom have any difficulty in retaining this injection for some hours, and a child may be made to retain half an ounce by the nurse sitting by the side of the cot and steadily pressing a folded napkin against the anus, whilst the little patient's attention is attracted by pictures or toys.

Should much shreddy mucous tissue, with or without blood appear in the stools, from 5 to 10 grains of alum, or of sulphate of zinc, may be added to the above enema; and if subacute symptoms supervene, one or two ounces of Infusion of Ipecacuan (Ipecacuan bruised, gr. xxx. to xc. Boiling Water 2 oz.) may be used instead of the water. Great benefit will often result from washing out the bowels (an hour or two before giving the above injection) with a couple of pints of warm water or an equal quantity of nearly cold water, to which half an ounce of soap liniment has been added.

I have referred to such works on Materia Medica as are at my disposal, and I find that the compound tincture of benzoin is spoken of only as a stimulant expectorant in chronic bronchitis, and as formerly used as a stimulant external application. I believe its effects upon the mucous membrane of the bowels are in a great measure of a stimulant evacuant character. It clears away the deranged secretion; at first it gently stimulates the membrane, and secondarily is sedative in its action. And when ulceration has occurred, it promotes healthy granulation.

It is probably due to the endeavours of the modern surgeon to obtain the healing of wounds by immediate union or by the first intention, that Friar's Balsam has fallen into almost complete disuse, if not disrepute, as an application to wounds which must necessarily heal by the second intention. I think the disrepute is undeserved, and although I would not revert to the practice indiscriminately, I certainly would do so in suitable cases.

It may be objected that as the compound tincture of benzoin contains aloes, it is scarcely a remedy likely to be beneficial where there is any irritation of the large intestine and especially of the rectum. But the quantity of aloes it contains is very small, about one grain in one drachm; and

whatever theoretical objections there may be, a large experience warrants me in asserting that practically none exist.

I have looked through the literature of Dysentery and Diarrhœa as exemplified in the writings of Sydenham, Annesley, Twining, Geddes, Mortimer, Mason Good, John Brown, Copland, Trousseau, Martin, Hooper, Watson, Aitken, Maclean, Tanner, Guy and Harley, but I find no notice of the use of the compound tincture of benzoin, unless such is included in a general reference by Brown and Copland to balsamic medicines in chronic dysentery. Nevertheless, I have a recollection of having seen a printed advocacy of the use of this remedy in chronic dysentery, though I have no note of reference to the authority. Therefore I repeat that I claim no originality in recommending this preparation in the cases I have mentioned; and I am so anxious to avoid any appearance of empiricism or routinism, that I must also repeat that I do not advocate the use of the compound tincture of benzoin to the exclusion of the ordinary remedies for dysentery and diarrhœa and for the pathological conditions with which they may be associated, but simply as an admirable addendum to such remedies in certain phases and stages of these diseases. And I feel confident that those who may be induced to try the remedy will soon be convinced that, as regards the conditions I have pointed out, they have in the compound tincture of benzoin a valuable addition to their Therapia.

Art. XIV.—*Report on two epidemics of Cholera in the Madras Penitentiary, during the year* 1866. By Surgeon W. H. Harris, M.D., in Medical charge.

(Communicated by the Inspector-General, Indian Medical Department.)

During the past year there have been three separate visitations of Cholera at the Madras Penitentiary, two of which have been reported as "epidemic." On the first of these occasions the disease appeared on the 23rd of July and continued until the 21st August. During this period there were 26 admissions and 14 deaths, the ratio of deaths to admissions being 53·8 per cent. The second outbreak took place on the 8th October and continued until the 18th idem. There were, on this occasion, only 10 admissions and 3 deaths, the ratio of deaths to admissions being 30 per cent. At the third visitation of the disease on the 9th and 10th November, only two cases were admitted and both died. In all, 38 admissions and 19 deaths, equal to 50 per cent.

In addition to the above, there have been 13 cases of Choleraic Diarrhœa admitted and 3 deaths, or 23 per cent. Some of these, if not the majority, might have been returned as Cholera; as they differed from true cholera only in the degree of collapse or in the period of its development. In all, the stools were "serous," and presented the characteristic rice-water appearance. Had these cases been all included in the Returns as cholera, the ratio of deaths to admissions would have been 43·5 per cent.

In order to illustrate clearly the mode of origin and progress of the epidemic within the precincts of the Penitentiary, it is necessary to enter somewhat into detail in regard to its construction.

The inclosure is situated on the north or left bank of the Cooum river, near the junction with it of Cochrane's canal. Chintadrepettah is on the south, on the opposite bank, and New Town lies a short distance away on the opposite side of the main street, on the west. The north faces towards the General Hospital and the People's Park, there being an open space between; and the east has also an open space, and the termination of Cochrane's canal between it and the Roman Catholic and St. Mary's Cemeteries. Cholera was rife in the two above mentioned suburbs, Chintadrepettah

and New Town, for more than a month before the first outbreak in the Jail; and as they both lie in the direction of the prevailing wind, during the south-west monsoon, it is not a matter of surprise that the disease ultimately found its way within the walls, but rather that it was kept at bay so long. The Jail premises are surrounded by two high walls, the outer 20 feet and the inner 12 feet high The various yards in which the prisoners are lodged are bounded by the inner wall on the north side of the enclosure; they are ranged parallel to each other and separated by the buildings forming the dormitories, or by a high partition wall. These yards are narrow and confined, and are well calculated to exclude the breeze and prevailing winds, and they afford very inadequate space for the number of prisoners lodged in them. A portion of each yard, close to the inner wall of the Jail enclosure, is cut off by a dividing wall, and contains a well and two small buildings, probably originally intended as latrines, but now used in most yards, only as day rooms, in which the prisoners eat their meals. In the European Juvenile and Female wards, one of them is still used as a latrine.

These yards from east to west are occupied by the undermentioned classes of prisoners:—

No. 1. Females.
No. 2. Juveniles.
Nos. 3, 4 and 5. Police Magistrates prisoners sentenced to 6 months and under.
No. 6. High Court prisoners.
No. 7. Europeans.
No. 8. Sheriff's prisoners.

Nos. 5, 6, 7 and 8 have upper storeys. The Sheriff's ward is perfectly distinct from the rest of the Jail, and is subdivided for the accommodation of Europeans and Natives (male and female) committed for trial, and it contains separate cook-rooms and latrines for their use, in order that on the score of discipline, they may not be brought into contact with convicted prisoners in any way. The hospital is between the walls on the extreme east side. In the south-west corner of the Jail enclosure is placed a large latrine, which is used by all the prisoners except Females, Juveniles, Europeans, and those in the Sheriff's yard.

The Police prisoners in Nos. 3, 4, and 5, go out to work daily, in various parts of Madras, from 8 A. M. to 5 P. M. None of the other prisoners ever leave the premises during their sentences, but those who are lodged in the Sheriff's ward have to attend the Police Courts, while under examination, and the High Court, during the Sessions, when committed for trial.

The first prisoner attacked with Cholera was a European in No.7 ward on the 23rd July. He had been confined nine days only. Europeans have little or no communication with the other prisoners, and they use a separate latrine in their own yard. Returning from leave on the morning of this man's death, after only 12 hours illness, I proceeded at once to inspect the yard, and found the latrine in a very objectionable state. Until this time the wet system of conservancy had been in operation throughout the Jail, and from its always having been considered eminently successful as far as wet conservancy can be made, and the latrines as free from smell, as a rule, as the free use of water and coal tar could make them, there seemed no great necessity to interfere with existing arrangements, until the efficacy of the dry earth system had been fully tested. I now, however, strongly urged the immediate introduction of the dry earth conservancy in the small latrines, in the inclosed yards, and my recommendation was complied with the same day. There has not been another case of cholera among the Europeans.

Number 6 furnished the next case on the 24th July; there were also two admissions from this ward on the 4th August.

Female ward.—One case on the 25th July, and one on the 20th August.

Numbers 3, 4 and 5 (Police Magistrates prisoners) with whom a few convicts from the Straits had been lodged for want of room elsewhere (but in a separate cell in upper storey of No. 5). First case a police prisoner on the 30th July, next a Malay convict on the 4th August; and then a police prisoner from No. 4, only a very short time in Jail, and another Malay were seized on the 6th. All the remaining cases occurred among the police prisoners in Nos. 3, 4, and 5, with the exception of two men attacked while sick in hospital, and one admission from the Sheriff's ward on the 13th of a man still under examination by the Magistrate.

The following table will shew the admissions from the several wards, and the dates, more clearly :—

Date.	Sheriff's Ward.	European, No. 7.	High Court, No. 6.	Malay and Police, No. 5.	Police, No. 4.	Police, No. 3.	Female, No. 1.	Hospital.	Total.
July 23rd.....	...	1	...	...	...	...	...	...	1
„ 24th.....	...	...	1	...	...	...	...	...	1
„ 25th.....	...	...	...	...	...	...	1	...	1
„ 30th.....	...	...	1	...	...	...	...	..	1
August 4th.....	...	...	2	1	...	...	...	...	3
„ 6th.....	...	...	...	1	1	...	...	...	2
„ 8th.....	...	...	...	...	...	...	...	1	1
„ 9th.....	...	...	...	...	...	...	...	*1	1
„ 11th.....	...	...	...	1	...	...	...	...	1
„ 13th.	1	...	...	...	...	...	...	...	1
„ 14th.....	...	...	...	1	...	...	...	...	1
„ 16th.....	...	...	...	...	1	...	...	...	1
„ 17th.....	..	...	...	...	...	1	...	...	1
„ 18th.....	..	...	...	1	2	1	...	...	4
„ 20th.....	...	...	...	1	1	...	1	1	4
„ 21st.....	...	...	...	2	...	...	...	...	2
Total...	1	1	4	8	5	2	2	3	26

It therefore appeared as if Cholera persisted in consequence of the exposure of the police prisoners to influences without the Jail, and that no local cause existed within the building. During the above period disinfectants were freely used in all the dormitories, but, on the admissions being so numerous on the 20th and 21st, all the police prisoners were put under canvas, and Nos. 3, 4 and 5 wards closed for a time and fumigated. Tents were pitched and occupied on the night of the 21st, when a heavy storm of wind and rain blew some of them down, and the men had to take refuge in the rope-shed ; 0·8 inch of rain fell between 2 A. M. and 9 A. M., and upwards of an inch during the following night. Next day the tents were pitched under cover in the rope-shed, and Cholera ceased for nearly two months.

* Re-admission.

Whether the sudden cessation of the epidemic should be referred to the evacuation of the wards, or to the storm by which the electrical equilibrium of the atmosphere was restored, it is difficult to say, but it is remarkable, nevertheless, that the epidemic ceased entirely from that day. The greatest care had been taken to prevent the possibility of the disease being engendered or fostered by any local condition. The sanitary conditions of the infected wards was perfect. They were empty during the day; there was no latrine in these wards; they were not overcrowded; and still the epidemic was increasing in severity and almost entirely confined to one class of prisoners, who were located in adjoining wards. Corresponding with the arrest of the epidemic within the Jail, there was a considerable diminution of it, among the population generally for some time, and, were it not for the subsequent history of the year, I should have felt conviction that the prisoners were infected during the work-hours outside.

Second Epidemic.—In consequence of the disturbances on account of the scarcity of grain and the high prices which prevailed, an unusually large number of prisoners were arrested and committed for trial during September. On my return from short leave in the end of that month, finding the Sheriff's ward very over-crowded, I mentioned the fact to the officer in charge of the Jail, and suggested the advisability of transferring a portion of the prisoners elsewhere, as otherwise another outbreak of Cholera, I thought, might be daily looked for, the disease having continued among the population generally up to that time.

The difficulty of guarding the prisoners, from want of a sufficient reserve of Police, and other considerations, I understood, were the reasons for the recommendations not being attended to, and the consequence was, as predicted, another outbreak of Cholera.

The first case was admitted from the Sheriff's ward on the 8th October. The prisoners in this ward being in the custody of the Sheriff instead of the Commissioner of Police, are kept perfectly distinct from all the other prisoners; and, as before mentioned, there are separate latrines and other offices for their exclusive use. The latrine for the male prisoners is fitted with 6 seats, and is sufficiently commodious for the ordinary number of prisoners waiting trial, who seldom exceed 40; but, at the time here referred to, there

were about 180, and the state of the latrine could not well be otherwise than most objectionable, consequent upon being constantly used by so many individuals. A temporary latrine in one corner of the ward, which had been suggested some days before, was now ordered to be constructed, and the following day, when another prisoner in this ward was seized with Cholera, the overcrowding was relieved by transferring half the prisoners into one of the other wards (No. 5) which had been cleared for their reception. The accommodation in the Sheriff's ward, allowing 500 cubic feet of space to each prisoner is only sufficient for 90 persons, but there are spacious verandahs besides, and as these were all fully occupied at night, the overcrowding in the sleeping rooms was relieved to some extent, and it may fairly be assumed, I think, that the disease, in this instance, originated in the latrine.

On the 12th two fresh cases were admitted from the Sheriff's ward and one from the female ward, and on the 13th two more from the Sheriff's ward, another from the female ward, and one from No. 6. On this date the remaining half of the Sheriff's prisoners were removed into No. 4, and the ward entirely evacuated, fumigated and shut up.

The type of the disease was much milder than in the preceding epidemic. Two cases of Choleraic Diarrhœa had already been admitted, and five others came under treatment between the 13th and 17th,—they all recovered; and on the 18th one more case of Cholera from the Sheriff's prisoners in No. 4 ward, which was fatal. The epidemic was then entirely arrested.

Another storm and very heavy downpour of rain occurred on the night of the 13th, and coincidently with it and with the evacuation of the infected ward, as in the first epidemic, the disease was almost entirely checked, there having been only one admission from Cholera subsequently, namely, on the 18th. 4·5 inches of rain fell between the 13th and 18th; there had been none for five days before. Hence the question again arises, to which of the two should be ascribed the elimination of the pestilence—the restoration of the electrical equilibrium, or the withdrawal of the prisoners from the infected ward? It is partly answered, I think, in the subsequent history.

On the 4th, 6th, and 7th November, three cases of Choleraic

Diarrhœa were admitted from the High Court prisoners in Transportation ward, and on the 9th and 10th, two cases of Cholera from the same class of prisoners in No. 6 ward. This ward was then immediately vacated on the 11th, and the disease completely arrested before it had assumed the proportions of an epidemic, with the exception of one case of Diarrhœa which occurred on the following day. On this occasion there was no perceptible change in the atmosphere, and the measures which were adopted were effective, alone.

From these foregoing facts, the good effect of moving bodies of men, from their locale, when contaminated with Cholera miasm, is well illustrated, and they serve to give force and promise to the precautions, which are now almost universally admitted as being necessary, in case of an outbreak of Cholera, if adopted in time. Considering, that prophylactic means are almost if not the only ones we possess, on which dependence can be placed for reducing the mortality from this cause, in order that the greatest advantage may be derived from them, they should be put in force, as early as possible, before the disease has assumed epidemic proportions and gained a firm footing in the place.

Few years pass without the occurrence of epidemic Cholera within the walls of the Penitentiary, in consequence, no doubt, of its position, and not unfrequently (as during the past year) it assumes formidable proportions. When the transfer of some of the prisoners was proposed, to relieve the over-crowding, the difficulty of guarding them seemed to be the chief obstacle and this had to be considered more than the grounds on which the recommendation had been made. It would be very desirable to keep a sufficient number of tents always at hand for occasions of this kind, and also a sufficient reserve of Police for the extra duty of guarding the prisoners when under canvas.

With respect to treatment, my experience accords with that of most others. On no simple plan can any reliance be placed. The remedies which appear to afford relief in certain cases are without the slightest effect in others, and but too often it has been the practice to give the palm to the method which proved successful last. Small doses of Calomel and opium (grain i. of the former with grain ¼ of the latter) every hour with minims v. to minims x. of Chloroform, stimulants, and nourishment at frequent intervals

have been my chief remedies; but I have also tried various others. Taking care not to prescribe anything in such large doses, that, if absorbed, they could do harm, I have continued treatment of some kind throughout the stage of collapse, in the hope of rousing the patient, in the same way as I would attempt to do so in collapse from any other cause; but I have varied the medicine in most cases after a trial from four to six doses, when, if there were no improvement, another medicine was substituted for it. In many instances recovery has taken place after three or four different remedies had been employed; while in some others the steady downward tendency to a fatal issue has not been checked by any of the means employed.

The following table exhibits most of the remedies employed and the final result :—

	Admitted.	Died.
Lead, Camphor, &c.	3	2
Turpentine mixture (Mudge's)	8	4
Condy's fluid	13	7
Mustard and Ipecacuan emetics, &c.	11	6
Salt with Liq. Sodæ Chlorinatæ as an emetic followed by saline drinks, &c.	14	5
Carbolic Acid	4	2
Calomel and Opium, with Chloroform and Stimulants	30	15
Small bleedings, 2 to 4 oz.	6	4
Strong Turpentine mixture (Frazer's)	4	0

Formula :—

℞. Olei Terebinthinæ, ℥iss.
Creosote, ♏ xx.
Tinct. Lavandulæ Co., ʒii.
—— Capscici, ℥iss.
Essentii Cinnamoni, ♏xviii.—Mix.

Dose ℥ss. to ℥i. statim et repeat dosibus ʒii. pro re nata.

Out of six cases in which santonine was prescribed after the presence of intestinal worms had been indicated, there were two deaths.

Dry cupping, with hot fomentations of the loins and diuretics, was employed often with apparent effect in restoring the urinary secretion in those cases in which vomiting and purging had ceased and collapsed persisted.

With regard to peculiar symptoms, in 15 cases, or almost

40 per cent., either vomiting of undigested food taken hours previously (in one instance two days) or the presence of lumbrici was noticed. From this fact it may not be unreasonable to infer that the proximate cause of cholera is, in many instances, due to intestinal irritation. Many other facts may be mentioned in support of this view; for instance, cholera is known frequently to be developed after neglected diarrhœa, but it is not often possible to adduce evidence of this kind in the case of prisoners, as by admitting it, they would confess to having neglected the order to report sick immediately looseness began. It is not improbable that the rationale of the action of a full opiate in an impending attack of Cholera is explained by its effect in allaying intestinal irritation, more than to its astringent property, and as opium can neither eliminate nor neutralize the cholera poison, it is difficult to account for its action in any other way. If it be assumed that the disease consists essentially of a specific poison circulating in the blood, it may be that its peculiar influence is chiefly felt by the digestive system, and that if its elimination by the intestines is prevented by an opiate, it may pass out of the system by the other excretory organs without giving rise to constitutional disturbance.

In four cases the evacuations were observed to become at first pinkish, and gradually more and more grumous in character, evidently containing altered blood: of these, three died.

Head symptoms supervened in four cases (including one of those referred to in the preceding paragraph); first the conjunctiva became very slighty injected, then the patient grew drowsy or listless and apathetic, semi-conscious, capable of being roused and of answering questions, slowly at first, but afterwards almost insensible and unable to articulate. Then food and medicine would be refused, conjunctiva more and more injected, and the motions passed involuntarily. In some the temperature was moderate, in others low, and pulse weak and slow—all indicating nervous depression and exhaustion, with perhaps cerebral congestion. They were all fatal.

Art. XV.—*Report on the Cases of Asiatic Cholera treated at the General Hospital, Madras, during the second outbreak in* 1866. By Surgeon W. N. Chipperfield, Acting Physician, General Hospital.

(Communicated by the Inspector General, Indian Medical Department.)

On the 20th November 1866, after an interval of three weeks from the date of admission of the last of the 114 cases of Cholera included in my previous report, the disease again commenced to afford admissions into Hospital.

A reference to Mr. Ellis' Mortuary Report for the fourth quarter of 1866, will show that throughout Madras there was a rapid decline in the deaths from Cholera (from 71 to 10) during the fifth, sixth and seventh weeks of the quarter. Ten deaths also occurred in the eighth week, and in the remaining five weeks a rise occurred until the deaths amounted to 88 in the week ending December 28th.

Meteorology. There is nothing in the recorded meteorological observations which would indicate any connexion between either the decline or the rise in the number of deaths from Cholera and any atmospheric or telluric influences. The *Barometer* slightly rose previous to the decline, and continued to rise slightly during the rise in the number of deaths. The *Temperature* fell one degree at the time of the decline, and continued to fall with slight fluctuations during the rest of the quarter. The *wind* blew from the north-east from the period of the decline to the end of the year. Its *velocity* fell just before the decline, and during the rise it very much increased, and continued high till the end of the quarter. Heavy *rain* fell in the week preceding the decline, and a heavier fall occurred in the week preceding the rise in the number of deaths. The per-centage of *humidity* fell slightly below the average at the time of the decline of the disease, and rose slightly above the average when the increase in the number of cases occurred, and fluctuated a little during the continuance of the outbreak.

The following table exhibits the date of admission, the sex, age, duration of disease, result, state on admission, and treatment of each of the 62 cases admitted during the outbreak.

TABLE I. *exhibiting particulars of* 62 *cases of Asiatic Cholera treated in the General Hospital, from November* 20*th*, 1866 *to March* 3*rd*, 1867, *during which time the disease prevailed epidemically.*

EUROPEANS.

No. of Case.	Date of admission.	Sex. M.	Sex. F.	Age. Yrs.	Duration of Disease from commencement to termination.	Time in Hospital.	Results. Recovered.	Results. Died.	Condition on admission; concomitant symptoms.	Treatment.
	1866.									
23	Dec. 18	1	...	43	2 days	33½ hours	...	1	Deeply collapsed, severe cramps, great distress, bloody stools. Delirium.	Saline Emetic and draughts, hot stimulants. Cupping to loins.
34	„ 30	1	...	25	Unknown	3½ „	...	1	Picked up by Police with only a flannel shirt on—Deeply collapsed, copious bloody stools.	Food and stimulants.
	1867.									
38	Jan. 2	1	...	30	24 hours	16½ „	...	1	Deeply collapsed, severe cramps—great distress—head symptoms.	Chlorodyne at home. Saline Emetic and draughts, hot stimulants. Blisters. Dry cupping, Quinine.
52	Feb. 5	1	...	55	28 hours	17 „	...	1	Collapsed, severe cramps, Dyspnœa, much blood in stools.	Saline Emetic and draughts, Quinine and Stimulants.
		4	...				...	4		

EURASIANS.

	1866.										
1	Nov.	20	..	1	29	8 days	8 days	1	..	Partially collapsed. Cramps. The menses appeared on recovery, having been absent 4 months.	Broths, Soda and Chloroform.
2	,,	25	1	...	16	9 ,,	7 ,,	1	...	Partially collapsed. Vomited round worms.	The saline draughts. Hot stimulants.
7	Dec.	2	...	1	6½	18¼ hours	11¼ hours	...	1	Collapsed. Cramps, no rallying.	The saline draughts, and hot brandy and water.
8	,,	7	1	...	19	13½ days	13 days	1	...	Partially collapsed. Cramps. Uræmia. Vomited worms.	Saline and Chloroform. Friction and heat.
	1867.										
35	Jan.	1	...	1	9	6 ,,	5 ,,	1	...	Not collapsed, but very feeble.	Chlorodyne at home, salines, hot stimulants, Blister. Pot. Chlor. and Sp Ether. Nitros. Purgatives, Enemata.
40	,,	4	1	...	15	7 ,,	6 ,,	1	...	Partially collapsed. Great thirst. Passed worms.	Saline Emetic and draughts, Santonine.
41	,,	4	1	...	19	32 ,,	32 ,,	1	...	Deeply collapsed. Violent cramps. Coma.	Do. Blisters, hot stimulants, Ether & Am., Enemata.
45	,,	8	1	...	24	13½ ,,	13 ,,	1	...	Partially collapsed. Severe cramps.	Saline Emetic and draughts. Pot. Chlor.
50	,,	20	1	...	30	10 hours	5½ hours	...	1	Do. do. do. Bloody stools.	Acids and opium. Saline draughts with Chloroform, hot stimulants.
			6	3				7	2		

NATIVES.

3	Nov.	28	...	1	30	27 hours	16½ hours	...	1	Deeply collapsed, cramps, jactitation, dyspnœa, no rallying.	Saline emetic and draughts, Hot stimulants.
4	Dec.	2	...	1	8	11½ days	11 days	1	...	Deeply collapsed, vomited worms, Uræmia.	Saline and chloroform, blisters, Pot. Chlor.
5	,,	2	...	1	2	19⅔ ,,	19 ,,	1	...	Deeply coll. Comatose for 36 hours.	Do. do. Hot stimulant.
6	,,	2	1	...	19	14¾ hours	1 hour	..	1	Do. dyspnœa.	Saline emetic, Heat, sinapisms to chest.

Table I.—Continued.

NATIVES.										
No. of Case.	Date of admission.	Sex. M	Sex. F.	Age. Yrs.	Duration of Disease from commencement to termination.	Time in Hospital.	Results. Recovered.	Results. Died.	Condition on admission; concomitant symptoms.	Treatment.
	1867.									
9	Dec. 8	...	1	40	5 days	3¾ days	...	1	Collapsed. Severe cramps, dyspnœa, Uræmia.	Emetic and saline draughts, Hot stimulants, Nitric Acid and Chloroform.
10	„ 8	1	...	46	4 „	4 „	1	...	Collapsed, no cramps.	Saline emetic and draughts.
11	„ 9	..	1	12	15 „	14 „	1	...	Collapsed, passed grumous stools.	Do. do. Hot stimulants.
12	„ 12	1	...	30	8½ „	8 „	1	...	Partially coll. vomited worms, Cramps	Do. do. do.
13	„ 12	...	1	25	4½ „	31 hours	...	1	Maniacal, collapsed. Fell into coma.	Do. do. do. blisters.
14	„ 13	...	1	25	9½ „	9 days	1	...	Collapsed, cramps.	Chlorodyne and Brandy at home. Salines.
15	„ 13	1	...	25	7½ „	7 „	1	...	Partially collapsed, fell into complete collapse, Cramps.	Brandy and Laudanum at home Saline Emetic and Draughts.
16	„ 13	...	1	70	20 hours	1 hour	...	1	Deeply collapsed, urgent dyspnœa.	Hot brandy and water.
17	„ 14	...	1	9	6½ days	6 days	1	...	Collapsed, passed blood from bowels, incessant vomiting.	Saline draughts, Hot stimulants, Pot. Chlor.
18	„ 15	...	1	5	18 hours	12 hours	..	1	Deeply collapsed, cramps, Coma.	Saline emetic and draughts, Hot stimulants.
19	„ 15	1	...	25	16¼ days	16 days	1	...	Partially collapsed, cramps, bloody stools, Uræmia.	Do. do. do. blisters and Chlorodyne, Pot. Chlor.
20	„ 16	1	..	50	6½ „	6 „	1	...	Do. vomited worms.	Do. do. do.
21	„ 17	...	1	25	13¼ „	13 „	1	...	Do. violent pain in abdomen, Uræmia, obstinate constipation occurred. Menstruated at expected time.	Do. do. purgatives and enemata.

22	,,	18	...	1	30	14½ days	14 days	1	...	Deeply collapsed, 7th month of pregnancy, semi-comatose, delivered of still born child on 23rd.	Do. do. with Chloroform, blisters and food.
24	Dec.	19	...	1	24	6½ ,,	6 ,,	1	..	Collapsed, cramps, Uræmia. Menstruated at expected time.	Saline draughts, Hot stimulants.
25	,,	19	...	1	7	11 ,,	10 ,,	1	...	Partially collapsed, vomited worms.	Saline emetic and draughts.
26	,,	19	1	...	37	10¼ ,,	9 ,,	1	...	Recovering on admission.	Food, tonics.
27	,,	21	...	1	7	15 hours	8 hours	...	1	Deeply collapsed, cramps.	Saline emetic and draughts, Hot stimulants.
28	,,	21	...	1	4	5 days	4¾ days	...	1	Do. do. severe cramps, passed worms, coma, convulsions.	Do. do. blisters, Pot Chlor.
29	,,	22	1	...	6	Unknown	9 ,,	1	...	Deeply collapsed, brother of last patient, passed worms.	Do. do.
30	,,	26	1	...	10	11¼ days	11 ,,	1	...	Deeply collapsed.	Do. do.
31	,,	26	...	1	35	Unknown	8½ hours	...	1	Do. severe cramps, dyspnœa.	Do. do.
32	,,	26	1	...	27	3½ days	3 days	1	...	Very feeble, but not collapsed.	Do. do.
33	,,	28	1	...	30	11½ ,,	11 ,,	1	...	Deeply collapsed, severe cramps, hiccup.	Do. do. Hot stimulants, blister.
	1867.										
36	Jan.	1	1	...	40	2 ,,	30 hours	..	1	Collapsed, Dyspnœa and pain in chest, cramps, Bloody stools.	Do. do. do.
37	,,	2	1	...	75	7 ,,	7 days	1	...	Partially collapsed, Dyspnœa, cramps.	Do. do. with Chloroform.
39	,,	4	1	...	50	28 hours	22½ hours	...	1	Deeply collapsed, Dyspnœa.	Do. do. Hot stimulants.
42	,,	5	..	1	24	36 ,,	36 ,,	1	...	Hospital nurse. Not collapsed, a mild case.	Do. do.
43	,,	8	1	...	60	2½ days	34 ,,	...	1	Partially collapsed, severe cramps, bloody stools, coma.	Do. do. with Chlor. do.
44	,,	8	1	...	25	14¾ hours	7¼ ,,	...	1	Collapsed, cramps, rapid sinking.	Do. do. do. do.
46	,,	11	1	...	26	6 days	6 days	1	...	Partially collapsed, cramps, bloody stools.	Do. do. do. do. Pot. Chlor. Dry cupping, Quinine.
47	,,	16	..	1	25	Unknown	3½ hours	...	1	Deeply collapsed, rapid sinking, Police case.	Do. do. do.
48	,,	17	.	1	25	6 days	5 days	1	...	Partially collapsed, very feeble.	Saline emetic and draughts.

Table I.—Continued.

NATIVES.

No. of Case.	Date of admission.	Sex. M.	Sex. F.	Age. Yrs.	Duration of Disease from commencement to termination.	Time in Hospital.	Result. Recovered.	Result. Died.	Condition on admission; concomitant symptoms.	Treatment.
	1867.									
49	Jan. 18	1	...	20	22¾ hours	10¾ hours	...	1	Deeply collapsed, violent cramps.	Saline emetic and draughts with Chloroform. Cupping to loins.
51	Feb. 2	1	...	21	8 days	8 days	1	...	Not collapsed, but very weak.	Do. do. aromatic stimulants and food.
52	„ 3	1	...	7	8 „	8 „	1	...	Partially collapsed.	Emetic.
54	„ 7	1	...	30	Unknown	23 hours	...	1	Deeply collapsed, severe cramps, Intense thirst, obstinate vomiting.	Saline emetic and draughts, Hot stimulants.
55	„ 7	1	...	50	....	....	1	...	Collapsed, severe cramps.	Do. do.
56	„ 12	...	1	2	26 hours	¾ hours	...	1	Dying.	External heat, Warm food and brandy.
57	„ 18	...	1	30	16½ days	16 days	1	..	Deeply collapsed, Uræmia. In 3rd month of pregnancy. Did not abort.	Saline emetic and draughts, Hot stimulants, Cupping to loins, aperients, blister.
58	„ 21	...	1	50	36 hours	22½ hours	...	1	Collapsed, severe cramps, rapid sinking, starved.	Acids at first. Cholera saline, stimulants.
59	„ 26	1	...	30	7 days	7 days	1	...	Not collapsed, but much sunken.	Astringents, Calomel and Dover's powder, Saline.
60	„ 24	1	...	44	5¼ days	5 days	1	...	Not collapsed.	Acid, Rhubarb, food.
61	March 1	1	...	22	5½ „	5 „	1	...	Do. but very weak.	Astringents and stimulants.
62	„ 3	1	...	42	18 hours	6¾ hours	...	1	Collapsed, cramps, no rallying.	Saline emetic and draughts, with Chloroform.
		26	23				30	19		

TABLE II, *showing the localities from which the 62 patients were brought.*

John Pereira's	10
Brought by Police	9
New Town	8
Poodoopettah	6
Chintadrepettah	5
Mount Road	5
Pursewaukum	4
Black Town	4
Near Hospital	4
Fort	3
Chepauk	2
Royapoorum	1
Vellore	1
Total	62

Although the number of cases under review was but 62, and the influence of season, sex and age was not very marked, it appears to be advisable, for the sake of uniformity, to continue the tables given in my former report.

TABLE III, *showing the number of admissions, recoveries and deaths in each of the months during which the epidemic influence prevailed.*

MONTHS.	Europeans.			Eurasians.			Natives.			Total.			Percentage of total	
	A.	R.	D.	A.	R.	D.	A.	R.	D.	A.	R.	D.	Recoveries.	Deaths.
November (10 days)	0	0	0	2	2	0	1	0	1	3	2	1	66·667	33·333
December	2	0	2	2	1	1	27	19	8	31	20	11	64·516	35·484
January	1	0	1	5	4	1	10	4	6	16	8	8	50·000	50·000
February	1	0	1	0	0	0	9	6	3	10	6	4	66·667	33·333
March (3 days)	0	0	0	0	0	0	2	1	1	2	1	1	50·000	50·000
Total	4	0	4	9	7	2	49	30	19	62	37	25		
Percentage of Recoveries.	...			77·778			61·224			59·677				
Do. of Deaths	100·000			22·222			38·776			40·323				

This table shows that the law of epidemics alluded to in my former report,—namely, that in the commencement of the outbreak the disease is more severe and fatal, and that the cases decline in severity and fatality, as the epidemic declines,—was not observed as regards the cases treated at the General Hospital on this occasion. However, it may be remarked that the cases are too few in number to allow of correct deductions, and that by far the majority of those brought in the month of January were in a deeply collapsed condition and presented very bad symptoms.

TABLE IV. *Admission, Recoveries and Deaths of each Sex of the three Races treated during the outbreak.*

RACE.	Admitted.		Recovered.		Died.		Percentage of Recoveries.		Percentage of Deaths.	
	Males.	Females.	Males.	Females.	Males.	Females.	Males.	Females.	Males.	Females.
Europeans.....	4	...	...	...	4	...	...	...	100·000	...
Eurasians.....	6	3	5	2	1	1	83·333	66·667	16·667	33·333
Natives.....	26	23	18	12	8	11	69·231	52·174	30·769	47·826
Total...	36	26	23	14	13	12	63·889	53·847	36·111	46·153

This table affords a good illustration of the impossibility of drawing correct inferences from too small a number of instances; for, taking the European patients alone, we might say that every case of cholera was fatal; and taking the Eurasian males alone, we might infer that the mortality was but 16·667 per cent.; whilst on collecting the above five groups into one class, we find the total mortality of the 62 patients to have been a trifle over 40 per cent. (table iii.) a rate which would have been considerably disturbed by a few more cases, according to their mode of termination.*

* Since this report was submitted this disturbance has taken place, for six more patients have come under treatment, of which five recovered and one died. Adding these cases to the 62 contained in the report, we have a percentage of 61·765 recoveries and 38·235 deaths.

TABLE V.—*The condition of the above 62 patients on admission.*

CONDITION.	Cases.	Recovered.	Died.	Percentage of	
				Recoveries.	Deaths.
Deeply collapsed	23	8	15	34·783	65·217
Collapsed with severe cramps	10	3	7	30·000	70·000
,, without cramps	4	3	1	75·000	25·000
Partially collapsed	17	15	2	88·236	11·764
Not collapsed with cramps	...	...	...	...	...
Not collapsed without cramps	8	8	...	100·000	...
Total	62	37	25	59·677	40·323

Upon comparing this table with the corresponding table in the former report, it will be seen that there was a larger proportion of deeply collapsed cases, with an improvement of 23·6 per cent. in the recoveries, and a larger proportion of partially collapsed cases, with 2·7 per cent. less recoveries; that the collapsed cases with severe cramps bore a somewhat less proportion to the total treated than was the case in the former outbreak, the mortality being the same; and that the non-collapsed cases bore the same proportion as before to the total, with an improvement of 25 per cent. in the recoveries.

TABLE VI.—*The Age of the above 62 patients.*

AGE.	Europeans.			Eurasians.			Natives.			Total.			Percentage of total		
	A.	R.	D.	A.	R.	D.	A.	R.	D.	A.	R.	D.	Admissions.	Recoveries.	Deaths.
Under 5 years	...	...	...	...	...	...	3	1	2	3	1	2	4·839	33·333	66·667
From 5 to 10 ,,	...	...	...	2	1	1	7	5	2	9	6	3	14·516	66·667	33·333
,, 10 to 15 ,,	...	...	...	...	...	...	2	2	...	2	2	...	3·226	100·000	...
,, 15 to 20 ,,	...	...	...	4	4	...	1	...	1	5	4	1	8·006	80·000	20·000
,, 20 to 25 ,,	...	...	...	1	1	...	4	3	1	5	4	1	8·006	80·000	20·000
,, 25 to 30 ,,	1	...	1	1	1	...	11	8	3	13	9	4	20·968	69·231	30·769
,, 30 to 35 ,,	1	...	1	1	...	1	7	5	2	9	5	4	14·516	55·555	44·445
,, 35 to 40 ,,	...	...	...	...	...	...	2	1	1	2	1	1	3·226	50·000	50·000
,, 40 to 45 ,,	1	..	1	...	...	...	4	1	3	5	1	4	8·006	20·000	80·000
,, 45 to 50 ,,	...	...	...	...	...	...	1	1	..	1	1	...	1·613	100·000	...
,, 50 to 70 ,,	1	...	1	...	...	...	5	2	3	6	2	4	9·677	33·333	66·667
Above 70 ,,	...	...	...	...	...	...	2	1	1	2	1	1	3·226	50·000	50·000
Total	4	...	4	9	7	2	49	30	19	62	37	25	100·000	59·677	40·323

The per-centages in this table vary considerably from those of the corresponding table in the former report. But this is not in the least surprising, as no one would for a moment expect that in each successive outbreak of epidemic disease, the cases would happen always in the same proportion among persons who have reached a particular age. However, if quindecennial periods are taken, it will be seen that there is some correspondence between this table and that given for the former outbreak, and the general result remains, viz., that no age is exempt from the disease.

The Epidemic. In three cases there was a history of previous diarrhœa continuing for two or three days; in the rest the symptoms of cholera set in suddenly.

Duration of the Disease in the Fatal Cases.—A reference to Table II will show that in by far the greater number of the fatal cases, death happened within a short time after admission into hospital, the periods being as follows:—within 1 hour, 3 cases; under $3\frac{1}{2}$ hours, 2 cases; under 5 hours, 1 case; under 8 hours, 4 cases; under 12 hours, 3 cases; under 18 hours, 3 cases; under 24 hours, 3 cases; under 36 hours, 4 cases; at $3\frac{1}{4}$ days, 1 case, and at $4\frac{3}{4}$ days, 1 case.

Uræmia.—In the two last mentioned and in one of the 36 hours cases the patients died comatose from uræmic poisoning, the only cases which proved fatal from this condition, though it was observed to be well marked in 12 of the patients, 9 of whom recovered.

Hæmorrhage from the bowels.—In 10 cases the dejections either contained partially coagulated blood, or were of a deep pink grumous tint from admixture of that fluid. Of these, 6 proved fatal. I look upon hæmorrhage from the bowels in cholera as a symptom of very serious import, showing an alteration of grave character in the condition of the blood, probably liquefaction of the blood corpuscles. In the later cases in which the symptom occurred, the treatment pursued was that recommended by Mr. Blacklock, viz., the exhibition of full doses of quinine, calomel, and camphor.

Acarides lumbricoides. In nine instances a note was taken of the passage of ascarides from either the stomach or bowels. One of these patients, a little child, subsequently died convulsed of uræmia. The above number does not represent all the cases in which the passage of worms occurred; it is so

common that it is almost unnoticed. The generality of the natives of Southern India are infested with these parasites, and their being evacuated when a patient is suffering from cholera, appears to me to be simply a mechanical matter. In conversing with me upon the frequency of this occurrence, Dr. W. Aitken very happily expressed his idea thereon, by saying "It is merely the rats running out of the empty house." Instead of looking upon the ascarides as having anything to do with the causation of Cholera, either in a predisposing or exciting point of view, I rather consider that the Cholera condition is a powerful anthelmintic, under the influence of which the parasites, if present, must necessarily be expelled; the drain which takes place from the blood dislodges them, and subsequently they either pass off with the intestinal discharges, or migrate to the stomach, and are from thence vomited.

Menstruation. Two women menstruated on recovery from the disease; one, case 21, table ii. at the proper period, the other, case 1, stated that the catamenia had been suppressed for four months.

Pregnancy. Two pregnant women were admitted. One in the 7th month, case 22, table ii. She was deeply collapsed and suffered from uræmia, remaining semi-comatose for some days. She was delivered whilst in this condition, on the 5th day after admission, and was discharged well on the 14th day. The other woman was in the third month and she did not abort. She suffered slightly from uræmia and was kept in hospital for sixteen days under the expectation that abortion would take place.

Contagion. Two patients were brought from houses where deaths from Cholera had occurred the day before they were seized. The following two cases may also be looked upon as instances of contagion. The nurse specially engaged for the Cholera ward, case 42, was taken ill with symptoms of Cholera, on January 5. She had been hard worked and harassed, and had partaken of plain cold boiled rice the night before. She did not pass into collapse but was very weak and sunken, and had suppression of urine with copious vomiting and purging of rice-water fluid. She immediately applied for treatment, and in 36 hours had recovered and insisted on resuming her usual duties.

Case 41, a Medical Student of the College Junior Department, was attacked on the 4th January. He was a poor, ill-

fed lad, deeply pitted with small-pox cicatrices. He had visited the Cholera wards once daily for about a week, but never came into constant or close contact with the patients as the attendants, the medical subordinates and I did. His residence was in Chintadrepettah and it was there he was seized. His was the most severe case which has come under my cognizance in which recovery took place. He suffered severely, was collapsed for three days, then became comatose, and remained so several days, and had not recovered until the thirty-second day, at which time he remained very weak.

One other case merits particular notice. Case 34, a powerful, finely-built European of 25 years of age, of dissipated habits, who had recently been in hospital for Ebriositas, bordering on Delirium Tremens, was brought by the Police on a stretcher, on the morning of December 30th. He had nothing on but a flannel shirt, and was picked up in this condition in a bye-street in Vepery. He was covered with filth, and whilst being washed he had an epileptiform fit. He was removed to the Cholera ward and was found to be deeply collapsed, but his voice was quite strong and he was able to give an account of himself, which subsequent enquiries proved to be partially incorrect. He said he had been drinking in company with a European and being very drunk, he was robbed of money and clothes and thrown out into the street where he lay all night. Vomiting occurred and profuse purging of rice-water dejections, deeply tinged with blood. He was quite pulseless, icy cold and covered with clammy exudation. Warmth was assiduously applied and stimulants both externally and internally used. He had a presentiment of death, asked where and how he would be buried, and gave the address of his friends in England. He never rallied, and within 3½ hours of being brought in he died, affording another instance of how intemperance and exposure may proclive to this dire disease

Treatment. I am content, at present, to acknowledge my ignorance of very many points connected with Cholera, and therefore am not ashamed to own that I have followed something of a routine, though not merely an empirical, plan of treatment. My intentions were, that during this outbreak all the cases should be treated alike so as to give a fair trial to the saline treatment, *i. e.* the exhibition of the Saline Emetic and Draughts described in my former

report. This was done in the greater number of cases, but a few exceptions occurred. In cases 1, 26, 60 and 61, the salines did not seem called for; cases 6, 16, 34, and 56 were entirely beyond the hope of relief; and in a few cases, admitted during my absence, the treatment was commenced by the administration of acids and opium. Otherwise, the treatment of both the primary symptoms and the complications was that detailed in the former report. The general result is, that the mortality has been about 40 per cent.; not quite so encouraging as I had hoped it would be, but still, considering the very severe character of the majority of the cases, I think it may be looked upon as favourable. It is 5½ per cent. more favourable than the mixed treatment employed at the General Hospital during the former epidemic, and from 12 to 22 per cent. better than the results obtained last year, so far as I can glean from the Journals, in London, Belgium, and Holland.

Disinfection.—I have used Carbolic Acid as a disinfectant. At first diluted with 200 times its bulk of water, then double this strength, and lately diluted with 50 times its weight. The Carbolic Acid does not destroy the texture of fabrics, so it is now employed for sprinkling on the bed clothes and for steeping the soiled linen in. But I have again resorted to McDougall's powder for use in the vessels receiving the discharges, and for dusting freely on the floor under the cots, as I have an impression that the combination of carbolate and sulphite is more decidedly deodorant and disinfectant than the carbolic acid *per se*.

Art. XVI.—*Supplementary Report on Cholera at the Royapettah Dispensary.* By Surgeon-Major P. G. Fitzgerald, M.D., Surgeon 4th District.

(Communicated by the Inspector General, Indian Medical Department.)

I have the honour to submit the following Supplementary Report of Cholera as treated in the Royapettah Hospital, from the 17th November 1866 to the 13th of March 1867.

2. During that period 35 cases of the disease were admitted into the Hospital, and 77 prescribed for as out-patients. The same reasons which compelled me to omit the latter class of patients from consideration in my former Report, necessitate their exclusion also from the few remarks I have to make on this occasion.

3. Of the 35 cases admitted, 17 died and 18 recovered. The time in hospital of the fatal cases varied from a few minutes to 48 hours, the average being 14 hours. Of those that recovered, the shortest time was 3 days, and the longest 18 days, average 7½ days.

4. All were undoubted cases of Cholera, presenting the well-known rice-water evacuations, and the characteristic countenance, the sunken eye-ball and congested conjunctival vessels. Cramps were present in 9 cases only, of whom 4 died and 5 recovered.

Ten cases were affected with intestinal worms, and of these, 2 died and 8 recovered.

In one case abortion took place in the fifth month of pregnancy. This patient recovered, but had a tedious convalescence from bed-sores.

5. Both sexes were nearly equally represented in the admissions, there being 17 males and 18 females, but there was a marked difference in the results. Thus, of the 18 females admitted, 12 recovered and 6 died; but of the 17 males, 11 died and 6 only recovered.

6. This apparent influence of sex on the result was also observable in the cases which formed the subject of my former report, although I did not specially allude to it, as it was not so strongly marked as in those now under consideration. For example, of the 45 cases therein mentioned, the

result of which was known, 24 were males with a mortality of 12 ; and 21 females with a mortality of 8 only. Taking the entire number of 80 cases of cholera treated since the commencement of the epidemic, the mortality among the male patients was in the ratio of 56 per cent., and among the females 36 per cent. nearly.

7. I am at present unprepared to suggest any explanation of this well-marked difference which, I am aware, is not in accordance with the experience of other Medical men.

I have on a former occasion alluded to the coincidence between the existence of worms in the intestinal canal, and a tendency to recovery from an attack of cholera, which I had observed on many occasions in the course of previous epidemics, and that observation receives further confirmation from the result of the cases now under review. If this apparently preservative complication had been exclusively or chiefly confined to patients of the female sex, the explanation of the difference in the ratio of deaths above adverted to would be obvious. But I find that the ten cases which were affected with worms were equally divided between the two sexes, and it is worthy of remark that the only two fatal cases presenting this complication were of the male sex.

8. It would be irrational and absurd to deduce any general law from, or found any theory upon such scanty materials and limited experience, but the facts and figures above stated though few are certain, and it is no less true that, as far as they go, they indicate a greater tendency to recovery from cholera in the female than the male sex.

9. The plan of treatment described in my former report was adhered to throughout the whole course of the epidemic. It has the merit of being simple in practice, and intelligible in its principle and aim to the Native Dressers attached to the hospital, and considering the class of persons who were the subject of treatment, and the hopeless condition in which many of them were, when brought to hospital, a mortality of 46·25 per cent. is not, I think, an unfavourable result.

ART. XVII.—*Note on some effects of the Oil of the Cashew nut (Anacardium occidentale).* By Assistant Surgeon W. H. MORGAN, 23rd W. L. I.

IN the month of March last two men were admitted into the hospital of the 23rd Regiment within a day of each other with hæmoptysis; the alleged exciting cause being by no means an ordinary one, the following cases may be deemed worthy of record.

March 3rd, 1867.—Regimental No. 387, Private Hurry Persaud, No. 1 Company, aged 30, service 11 years. Admitted last evening at 7, complaining of having spat up quantities of blood of a bright red colour since 2 P. M. Patient was on duty at the Fort, and had been to take his mid-day meal to the regimental lines and gone back. The meal consisted of rice, dholl, and ghee. About an hour after his return he suddenly felt an inclination to vomit, and coughed up a quantity of bright blood; he washed his mouth and face in cold water, and fell asleep; in about an hour the vomiting recurred. He vomited again after his admission into hospital, and the Dresser attached to the regiment confirms the man's statement that the blood was of a bright red colour, but he did not measure the quantity. He gave him draughts of sugar of lead with dilute acetic acid and laudanum. Two or three of these draughts checked the vomiting, and the man was discharged from hospital on the 5th instant.

The second case was a graver one, the symptoms severer, and not so easily checked, and the patient died ultimately of phthisis, but I would draw attention to the alleged exciting cause of the hæmoptysis.

March 3rd, 1867.—Regimental No. 380, Private Seetiah, No. 1 Company, aged 30, service 10 years. Admitted at 6-30 this morning, complaining of having spat up bright blood since 8 A. M. yesterday. He was Orderly to one of the Staff on that day, and coughed up a quantity of blood as he was carrying a letter. The vomiting recurred several times during the day, but the man did not report sick till this morning. The Dresser administered the same remedies as in the preceding case, and the vomiting appeared to have been

checked when I visited the hospital. Wishing to enquire further about these cases, I returned at noon ; calling the men into the Surgery I had some conversation with them, and after dismissing them, I was about entering their cases in the journal, when I heard the second patient vomiting. He brought up 6 oz. of bright red blood. He had taken his rice with mutton and brinjall curry at 11 A. M., but in the vomited matter there was no particle of food ; pulse 108 ; skin of natural temperature ; no pain in the chest or abdomen. Ordered the sugar of lead draught to be continued until ice could be procured.

Vesp.—Brought up 20 oz. of blood since I saw him this afternoon ; pulse 108.

8-30 P. M.—Coughed up blood again, but not in large quantity, the amount thrown up during the night will be given to-morrow morning ; pulse the same.

4th.—Coughed up blood again at 1 A. M., the quantity measured this morning amounts to 10 oz. ; skin hot ; pulse 108 ; bowels confined ; has begun vomiting again.

Vesp.—Vomited 7 oz. of blood while the above entry was made, but not since ; bowels moved twice ; skin hot. Subsequently only 2 oz. of blood mixed with frothy mucus were coughed up, and the sputa were still later tinged with blood.

Treatment.—As long as the hæmoptysis continued, the patient had ice to suck, iced cold water to drink, an ice bag externally for a short time, and draughts in which either sugar of lead, the oil of turpentine, the infusion of matico or gallic acid were the active ingredients ; a dose of aperient medicine was given on the second day and absolute rest enjoined.

Both these men attributed the vomiting of blood to (incautiously) inhaling the acrid fumes of cashew nut oil with which they had latterly been in the habit of polishing the stocks of their muskets. Of this nut (Anacardium occidentale) Colonel Drury says :* "The pericarp contains a black acrid oil which, owing to its caustic properties, is often applied to floors or wooden rafters of houses to prevent the attacks of white ants. It requires, however, to be used cautiously. This oil is called Cardole and is a powerfully vesicating agent. It is applied to warts, corns, ulcers, &c., but it is

* Useful Plants of India, edition 1848, page 33.

said that the vapour of the oil, when roasting, will produce violent swelling and inflammation."

I was informed by both the patients and the hospital havildar that there were several men in the lines who had suffered from a train of symptoms (to be presently given) since they began the use of cashew nut oil for the purpose before mentioned. Bearing in mind the disposition of sepoys to magnify trifles, I examined above a dozen individuals, and from the following statement there can be no doubt that they corroborate each other in most particulars. The old operation of polishing stocks (with a rag dipped in cocoanut oil) was comparatively easy, while the new one necessitates expression of the oil from the pericarp of the cashew nut, and more manual exertion than would suit the indolent. The cost of the oil to men who have no spare cash was another consideration, but most of those I asked declared that there was no difference in the expense of the two processes. There can be no question as to the superiority of the polish.

1. No. 596, Private Padeyah, No. 1 Company, has had a burning sensation in the eyes and stomach, and also in the palms of the hands since the 2nd March 1867. Believes these symptoms to be owing to the fumes of cashew nut oil which he uses in polishing the stock of his musket. He used the oil for two months, but it was only four days ago that he felt the above. Has been generally in good health.

2. No. 872, Chendreyah, No. 5 Company, has slight injection of the sclerotic conjunctivæ, to which he has been subject for the last month, which he attributes to the use of cashew nut oil as in the preceding case. Has also had burning of the eyes, nose, hands and soles of the feet, and of the stomach. Has been using cashew nut oil for the last month; general health, good.

3. No. 288, Iamayer, No. 3 Company, has slight rawness of the right palm, and an ulcerated patch an inch square on the right fore arm. About fifteen days ago had a swollen face, also burning sensations in the chest, stomach, eyes, hands, some cough; all which he attributes to the use of cashew nut oil as in preceding cases. Used it for two months.

4. No.——, Chinnasawmy Naigue, No. 1 Company, stated that he had bleeding from the nose for last three days, burn-

ing of the eyes, stomach, and palms of the hands. Uses cashew nut as in preceding cases for cleaning stock of musket.

5. No. 327, Naigue Sheik Homed, No. 5 Company. Has a burning sensation in the eyes and nostrils, in the throat and stomach, conjunctivæ injected, has had epistaxis once in two days; attributes these symptoms to the use of cashew nut oil as in preceding cases, begun its use for cleaning a month and a half ago. The burning sensations set in ten or fifteen days ago.

6. No. 680, Private Rungasawmy, No. 6 Company. Has had a burning sensation in eyes, nostrils and stomach for the last seven or eight days; attributes these symptoms to the use of cashew nut oil. Has used the oil for a month or a month and a half.

7. No. 460, Private Sheikh Massoon, No. 1 Company. Has had burning sensations in eyes, nostrils and stomach for twenty days; attributes them to the use of cashew nut oil. Has used the oil for a month and a half.

8. No. 804, Private Oosman Khan, No. 5 Company. Has had burning sensations in the eyes, nose and stomach for last month; describes the feeling in the last-named organ to that experienced when quicklime is taken; conjunctivitis present; used the oil for two months.

9. No. 225, Private Sheikh Abdoolla, No. 1 Company. Same symptoms as preceding case; has used cashew nut oil for more than two months.

10. No. 281, Private Annamanthoo, No. 1 Company. Rawness of hands and other symptoms as in two preceding cases; used cashew nut oil for two and half months.

11. No. 851, Private Sheikh Mooltan, No. 1 Company. Agrees in the statements made by last three cases; used the oil for two months.

12. No. 850, Private Mariappah, No. 1 Company. Corroborates preceding cases, having suffered similar symptoms; used cashew nut oil for two months.

PART II.

REVIEWS AND NOTICES OF BOOKS.

On Inhalation, as a Means of Local Treatment of the Organs of Respiration, by Atomized Fluids and Gases. By HERMANN BEIGEL, M.D., L.R.C.P.L., &c. &c. London: Robert Hardwicke, 1866, 8vo. pp. 200.

THE tendency of Physicians in the present day as regards diagnosis is to multiply physical means, and to this we owe the introduction of the speculum, the ophthalmoscope, the endoscope, the laryngoscope, the thermometer, the sphygmograph, &c. as instruments having their proper use and value; and in his preface Dr. Beigel claims something similar as regards Therapeutics, for he says :—

"The treatment of our days endeavours to become *local*, wherever it is feasible. Two excellent results have recently been obtained in this direction, the one is the *hypodermic injection*, by Alexander Wood, in Edinburgh, and the other the *inhalation of atomized fluids*, by Sales-Girons."

As a justification of Sales-Girons' endeavours to improve the means of inhalation, leading him to the invention of a portable apparatus for the pulverization of fluids, our author says :—

"The value of inhalations is the greater as they render great services in those illnesses which generally prove fatal to a vast number of the human race, viz., diseases of the organs of respiration. Chronic bronchitis is one of those foes which medicine opposes but feebly; consumption and death are still almost synonyms; and although inhalations cannot boast of being able to *cure* phthisis, yet in many cases they are able to alleviate troublesome symptoms, and to place the patient in such a position as will enable him to pursue his ordinary avocations in life. At all events, it cannot be doubted any longer that inhalations have proved serviceable, where a long-continued use of other medicaments failed.

"Here I should not like to be misunderstood. I do not consider inhalations a Panacea for chest diseases; far be it from me to do so

I merely intend to show that, when applied to the appropriate cases, the atomized fluids are very valuable agents, and deserve to range prominently in the Materia Medica."

Dr. Beigel divides his work into two parts :—I, On Inhalation in general ; II, On Inhalation applied to Special Diseases, containing the details of thirty-two selected cases, in which atomized fluids were beneficially employed. In the first chapter he gives a historical sketch of inhalation, from which we learn that pulverized fluids were first used as medicaments by Auphan in 1849, but very imperfectly and only in an inhalatory, it being left for Sales-Girons to convert the fluid into a fine mist, and to construct a portable apparatus which could be used in every private dwelling. The second chapter enters upon the consideration of whether the atomized fluids pass the larynx and trachea and penetrate into the lungs, which those who have "an innate dislike to everything called progress" answer in the negative. However Demarquay, using a solution of perchloride of iron, demonstrated upon rabbits that the iron reached the mucous membrane of the larynx, trachea and bronchi, and, using a solution of tannin for oral inhalation in a woman who had a tracheal fistula, he proved that the atomized fluid passed through the larynx, for its chemical action was produced on a test paper with which the tracheal fistula was closed. Trousseau early gave his adherence to Sales-Girons' views and "expressed his astonishment how the penetration of atomized fluids could be doubted, since the penetration of coal particles, crystals, and the like into the bronchi and lungs form an established fact." Dr. Beigel appeals especially to his English readers by calling their attention to the researches of Drs. Peacock, Bristowe and Greenhow into the nature of grinders' asthma and phthisis and miner's black-lung, and concludes thus, the sentence being printed in italics :—

"It is, therefore, confirmed beyond doubt that atomized fluids enter the respiratory tract and penetrate into the very cells of the lungs ; that, therefore, by means of inhalation, remedies most appropriately and successfully may be applied to the organs of respiration."

Our author next gives us a description of the apparatus used for atomizing the fluids. Those who are familiar with *Rimmel's Perfume Odorateur* will at once understand the apparatus now generally used. It essentially consists of two

small tubes open at each end, the apertures at one end being contracted ; the tubes are placed at right angles to each other with the narrow apertures approximated, the larger end of the vertical tube dipping into a vessel containing the fluid to be atomized, whilst a blast of air is driven through the horizontal tube, producing a vacuum in the other, in which the fluid rises by aspiration and is turned into fine mist on leaving the capillary opening. In the *Odorateur,* the mouth of the operator furnishes the blast, but in the inhalation atomizers, as it is of importance that the inhaler should be independent of assistance, the blast is produced by other means. Dr. Bergson invented a bellows apparatus consisting of a caoutchouc tube, about a yard in length, attached by one end to the larger mouth of the horizontal tube, and having its middle and other end expanded into a ball, the middle ball being an air-reservoir, and the other a bellows to be compressed by the hand of the patient. Dr. Richardson's "hand ether spray producer" is in reality this vaporizer of Bergson. Other inventors produce the blast by compression of the air contained in a brass receiver fitted with a stop cock, to which is attached the horizontal tube ; the compression being effected by some by the use of an air-pump, by others by means of steam, a small boiler and spirit lamp taking the place of the tube and bellows of Bergson. This latter apparatus is that which is generally preferred and it can be made very portable. Dr. Beigel has improved the apparatus by adding a screen. He found that from all the vaporizers, the cloud of steam—an expanding cone—not only entered the patient's mouth, but was also propelled against the face and eyes, producing discomfort and irritation when acrid substances were used. His screen we will describe in his own words :

"It consists of a turned wooden disc, which is hollowed funnel-like, prolonged in the middle into a mouth-piece with an opening of the size of a shilling. The rim is turned inwards, having on its lowest point a small opening, into which a gutta-percha tube is fixed, the end of which may be put into any glass, and through which the fluid, created by the superfluous steam and subdivided vapour, runs. The disc, fixed by means of an arm to a stand, can be lowered or heightened, and moved in every direction, *ad libitum.* The whole apparatus is placed between the inhalation apparatus and the inhaler, who sits comfortably with her opened mouth before the mouth-piece of my screen, inhaling the atomized jet coming through it."

Our author next indicates some points to be observed in inhalations. First, it will be necessary to use tubes with capillary openings of different sizes according to the diseases to be treated, as the minuteness of the spray is in proportion to the minuteness of the tube apertures. Secondly, as to the mode in which the inhalations may be performed. They have been found useful in conjunctivitis and keratitis, in affections of the ear, upon ulcers, &c., as well as upon the organs of respiration. Again

"As the respiration is performed more or less powerfully and deeply, the atoms of the pulverized fluid reach the more or less distant organs of that function. From this fact it becomes self-evident that it will be necessary to inspire feebly if the influence should be directed upon parts situated in the mouth or pharynx, more powerfully and sometimes strenuously if it should be our intention to act upon the larynx, trachea, or lungs. And, further, as the lungs admit the greatest amount of air when the sitting position is assumed, it is manifest, that we should place the patient in that position if we intend a deep penetration of the atomized cloud, whilst we should allow him to stand if we merely intend to act upon organs not so far distant."

Some persons are so nervous and excited that they are some time before they can accustom themselves to the inhalation. Pure water or even milk may be used in such cases until the sensitiveness has passed away.

The *temperature* of the atomized cloud, varies in proportion to the distance from the spout of the apparatus. If necessary, the fluid may be warmed by a spirit lamp placed beneath the vessel containing it. It is well to personally superintend the first inhalation; the patients may be directed to make a hundred inspirations at first, making a pause of a few seconds after every ten or fifteen deep inspirations which should be performed deliberately and without hurry. The number of inhalations may be increased on subsequent occasions.

The tubes should be cleaned after each inhalation by keeping the apparatus in action, pure water supplying the place of the fluid which has been used.

In the sixth chapter Dr. Beigel treats of the medicaments used in inhalation, and commences by saying,

"Generally speaking every chemical body which is soluble can be atomized, and therefore inhaled. Thus the greater number of

remedies contained in the 'Materia Medica' can be used for the local treatment of the respiratory organs.

"But it must be borne in mind that besides the local effect of the spray, absorption takes place also, and that the medicaments are even much more readily absorbed through the mucous membranes than they are by internal application—a fact which must be taken into consideration when the dose is to be decided on."

Of course if a new edition of Dr. Beigel's work be called for, he will re-write the second paragraph of the above extract, for we presume he does not mean to assert that medicaments are not as much internally applied when inhaled as when carried into the stomach, but rather that they are more readily absorbed by and more directly act on the pulmonary, than the gastric, mucous membrane. Further on we learn exactly what he means, for he says:—

"There exists, therefore, the one great difference that—with inhalation the local action is obvious; with medicaments internally given, is often highly problematical."

The following medicaments are the most serviceable for inhalation.

Nitrate of Silver, three to five grains in an ounce of distilled water. In inflammatory conditions of the pharynx and larynx.

Nitrate of Aluminium, two to five grains in an ounce of water. In inflammatory and nervous affections of the larynx and trachea.

Tannin, one to ten grains in an ounce of water. Astringent and styptic, in chronic catarrhs.

Alum, one to twenty grains in an ounce of water or aromatic infusion. Styptic, and better than gargles in inflammatory conditions of the fauces.

Sesquichloride of Iron, five to twenty-five minims (of the Tincture) in an ounce of water. Very valuable styptic in hæmoptysis.

Acetate of Lead, three to ten grains. In inveterate, troublesome colds.

Sulphate of Zinc, one to ten grains. Weak solutions in chronic inflammation of the respiratory mucous membrane; strong solution as inhalatory gargles.

Common Salt, three to twenty grains in an ounce. In all stages of consumption.

Tincture of Opium, five to twenty minims in an ounce. In troublesome cough when not contra-indicated.

Liquor Arsenicalis, five to ten minims in an ounce of water. In inveterate cases of asthma.

Pure water, cold, warm, or hot. Of great service in inflammation and paralysis of the larynx.

Glycerine, destroys fœtid odours and is useful in laryngitis and tracheitis associated with hoarseness and loss of voice.

Lime-water, one part lime to one hundred parts water. A *powerful* solvent of the exudative membranes of diphtheria.

The salts of iodine, bromine, chlorine, &c. have also been used, and lastly Dr. Beigel tells us, as if to show how a hobby may be ridden :—

"In conclusion, *cod-liver oil* may be mentioned. It can also be turned into a spray, if an apparatus is used with rectangular tubes, the openings of which are wider than usual, and a larger flame than commonly necessary is kept up. Although I am led to believe that the administration of cod-liver oil by means of inhalation would prove much more convenient and beneficial than when that substance is internally taken, yet it has the inconvenience that the room wherein the atomization has taken place for many weeks retains the smell of the oil, so that the administration in the form of spray could only be effected in hospitals, where a separate room could be spared for the purpose wherein the patients would remain for some hours of the day, being entirely involved in clouds of cod-liver oil."

Dr. Beigel next relates certain immediate effects of inhalation which must be known to the physician to enable him to predict them to the patient. After which we have a description of the arrangements most suitable for inhalations in hospitals and dispensaries, and for the inhalations of gases, especially oxygen. As we have hinted at a slight inclination on the part of our author to ride a hobby, it is but justice to make the following quotation :—

"In conclusion, it might not be amiss just to mention, that recently certain vapours, obtained during the process of purification of common burning gas, have been applied for whooping-cough. From different parts of the Continent cases have been reported in which cure was effected very rapidly. In many of these reports an enthusiasm prevailed which very often takes possession of such new inventions and adorns the reports with a hue which vanishes before the rays of cool, critical investigation. At all events, there are not yet reports enough to enable us to express an opinion as to the value of this new medicament."

The second part of the work is devoted to a relation of cases in which inhalation has formed the principal element in the treatment, prefaced by a few pathological remarks. The following are the diseases treated of—Laryngeal Hyperæsthesia; Œdema glottidis: Laryngitis; Croup; Diphtheria; Bronchitis; Asthma; Emphysema; Hæmoptysis; Phthisis; Gangræna Pulmonum; Whooping Cough.

We cordially welcome Dr. Beigel's book, and believe that he has shewn an enlightened appreciation of a mode of treatment of affections of the respiratory organs, which deserves a far more general use than it at present enjoys. The aim of the author is so well shewn in his "conclusion," that we give it entire.

"I should not like to conclude these pages without making the following remarks on the cases contained in the second part. They were selected out of a considerable number of which I possess notes, too numerous to be incorporated with this treatise, without making it more voluminous than was intended. With a very few exceptions, the cases are such as have been cured or very much improved by inhalation, and this is just the point at which I am aiming. It was by no means my intention, presenting cases only in which the inhalatory treatment has been applied successfully, to show that such results will always be obtained by the administration of atomized fluids. That was not my purpose. Inhalation not being generally used, or even known, I, being convinced that it deserves a prominent place in the treatment of pectoral disease, was anxious to prove—particularly to those gentlemen who proclaim it to be void of any value—that a cure can be effected by the new method, and I may add, in a manner which gives, provided the case be apt for inhalations, the preference to that method over all other kinds of treatment.

"The final aim of every physician is to *cure* the patient, and I do not consider that we are justified in protracting a disease or allowing a patient to die, without having exhausted every possible therapeutic means; but my intention was to show that inhalation is a source by no means to be neglected in diseases of the organs of respiration. He who expects wonders from that mode of treatment will soon be disappointed; he who recommends it as an infallible one, will prove a false prophet; but an unprejudiced application of the atomizer will lead to the conviction that the invention of Sales-Girons has been a most valuable addition to therapeutics."

As regards "the get up" of the book, Mr. Hardwicke's name on the title page is a guarantee that it is everything that could be desired.

A Practical Treatise on Urinary and Renal Diseases, including Urinary Deposits. Illustrated by numerous cases and engravings. By W. M. ROBERTS, M.D., F.R.C.P.L., Physician to the Manchester Royal Infirmary, &c. London: Walton and Maberly, 1865, Small 8vo. pp. 523.

DR. ROBERTS divides his work into three parts. The first is introductory and treats of the physical and chemical properties of the urine in health and disease, and of course includes urinary deposits. The author does not attempt to give an abstract even of the recently accumulated array of researches on the composition of the urine and the rate of excretion of its several ingredients. For these purely chemical and physiological materials, which can scarcely be said to possess much clinical value at present, he refers his readers to the treatises of Neubauer and Vogel, Parkes, Beale, Thudichum, and Hassall; he hopes, however, that nothing has been omitted from his pages, a knowledge of which possesses any interest for the actual practice of medicine.

This part of the book is concise but very complete. The physical properties and mode of examination of the urine are first described: then the chemical constituents and their variations; next Inorganic Deposits; and, lastly, Organic Deposits. The more important deposits are considered under the following heads:—naked-eye characters, micro-chemical characters, production and occurrence, clinical significance, and treatment. We would especially direct attention to the sections on Oxaluria, Hæmaturia, Albumen, and Sugar, as affording admirable summaries of the more recent knowledge of these morbid states of the urine. As regards oxaluria, Dr. Roberts quotes from Dr. Golding Bird, a description of the symptoms which accompany the disease, but questions whether there is any real *oxalic acid diathesis*. He says:—

"The patient often fixes on some derangement of the sexual function, generally, in these times, on spermatorrhœa, under the inspiration of unscrupulous publications too widely circulated among the curious public; or on heart disease, consumption, or gravel. The physician is able by means of physical examination to set aside

these more open delusions, but falls himself into a trap of his own ingenuity, and is only more elaborately wrong than his patient. He finds crystals of oxalate of lime in the urine, and persuades himself that he has discovered the first link in the chain of consequences. It may be much questioned (and I certainly see no necessity for such a supposition) whether there be any morbid condition antecedent to the plain symptoms of the case, namely, a nervous system upset, because overtasked, and a digestion deranged because mismanaged."

He gives his reasons for these remarks, viz. :—

1. Intense oxaluria may exist persistently without evoking the group of symptoms attributed to the oxalic diathesis.

2. This group of symptoms may exist in typical development without the occurrence of oxaluria.

3. The most varied morbid states co-exist with oxaluria.

The second part of the work, occupying 128 pages, is devoted to diseases of which the chief characteristic is an alteration of the urine. The diseases treated of are Diabetes insipidus, D. mellitus, Gravel and Calculus, and Chylous urine. Although the size of Dr. Roberts' book would scarcely allow of such amplified treatises on these diseases as we meet with in other works, yet we really do not find any point of importance omitted, and we think it of advantage not to have to wade through long statements of opinions which have been advanced and are stated simply for the purpose of being refuted. We would particularly call attention to the sections on Gravel and Calculus, especially those on the diagnosis of the species of urinary calculi within the bladder or kidney ; and in the preventive and solvent medical treatment of calculi.

As regards diagnosis we extract the following which we think particularly worthy of attention :—

"The most certain knowledge is gained when a person who has been in the habit of spontaneously voiding small concretions becomes afterwards the subject of stone. In such a case, the examination of the calculi previously passed (supposing them to have been preserved) throws a sure light on the nature of the one retained—provided the epoch at which the former were voided be not too remote, and the characters of the urine continue to correspond.

"In the absence of this kind of evidence, certain knowledge of the nature of the stone is rarely attainable ; but still, it is generally possible to indicate—from the character of the urine, the constitu-

tion of the patient, and the known relative frequency of the several species of stone—*with strong probability*, the species to which it belongs; and also (and with still greater certainty) some of the species to which it does *not* belong.

"With regard to the character of the urine, the most important indications are supplied by the nature of its reaction, and the character of the deposit which may be precipitated from it. The re-action of the urine may be (*a*) acid; (*b*) alkaline from fixed alkali; or (*c*) alkaline from carbonate of ammonia.

"(*a*). If the urine be *acid* the stone is almost sure to be uric acid or oxalate of lime, or a mixture of these two.* These two deposits alternate with each other so frequently, and at such short intervals, that, if the urine be free from a uric acid or an oxalate of lime sediment, there is nothing to indicate directly, which of the two species the stone belongs to. But, as uric acid is much more common than oxalate of lime, the probabilities are considerably in favour of the former. If the urine, on cooling, deposit abundantly either uric acid or oxalate of lime, and *à fortiori*, if either of these deposits are found in the urine at the moment of emission, there is strong probability that the *surface* of the stone is of the same nature; but this gives no warrant of the composition of the deeper strata.

"Vesical calculi are usually more complex in their composition than renal calculi. . . . If the urine be acid, and the calculus of recent date, the probabilities are greatly increased that it is composed of uric acid alone. . .

"Persons of gouty disposition are more likely to be the subjects of uric acid, than of oxalate of lime calculi.

"*b.* If the urine be *alkaline from fixed alkali*, the stone will be composed either of bone-earth phosphate or carbonate of lime. Both are of extreme rarity.

"*c.* If the urine be *alkaline from carbonate of ammonia*, the composition of the nucleus and body of the calculus can no longer be divined; but its surface is sure to be composed of the mixed phosphates. The depth of this crust can only be conjectured from the intensity of the ammoniacal reaction, the quantity of pus and flakes which are discharged with the urine, and the length of time during which this state of urine has persisted. Care must be taken to ascertain if the urine be ammoniacal *at the moment of emission*; for in most cases of stone there is some degree of cystitis; and the presence of pus causes a urine which was passed acid, speedily to

* "Concretions of xanthine, fibrine, and fatty matters are altogether left out of consideration, on account of their extreme rarity. Cystine is also excessively rare; and if cystine crystals be not found in the deposit, it may practically, be likewise excluded."

become ammoniacal. The degree of the ammoniacal reaction is best judged of by the intensity of the ammoniacal odour, by the gelatinized, or loose, condition of the pus, and by the abundance of triple phosphate crystals. If the urine be only very feebly ammoniacal, or have only recently become ammoniacal, the phosphatic crust may be only a thin film. In the case of large or old phosphatic concretions, fragments of phosphatic *débris* are frequently voided with the urine. If the ammoniacal reaction of the urine is once established in a case of stone it seldom afterwards gives place to an acid reaction."

The third part is devoted to organic diseases of the kidneys; viz., congestion, or renal derangements which are occasioned rather by an undue determination of blood to or some mechanical obstruction to the return of blood from, the organs; Bright's disease, acute and chronic; suppuration in the kidney: renal embolism; pyelitis and pyonephrosis; concretions in the kidney; hydronephrosis; cysts and cystic degeneration of the kidneys; cancer, benign growths, tubercle of the kidneys; Entozoa, and anomalies of position, form, and number of the kidneys.

We had marked for extract several passages in the section on Chronic Bright's disease, but upon reconsideration we find we could not do justice to the completeness of Dr. Roberts' treatises by simply presenting our readers with short extracts from various parts of the text. We prefer, therefore, notwithstanding its length, to re-produce the following section:—

"Uræmia.—Certain phenomena, chiefly affecting the nervo-muscular system, arising in the course of Bright's disease, have been attributed to a poisoned state of the blood, from the retention in it of excrementitious matters which the disabled kidneys are unable properly to eliminate. To these phenomena the term *uræmic* has been applied; they consist of twitchings and convulsions of the voluntary muscles, headache, drowsiness, coma, defects of sight and hearing, vomiting, and diarrhœa.

"It is a marked feature of uræmic phenomena that those which are of a paralytic nature affect the sensorium and the special senses, but not the voluntary muscles; while those of an opposite kind (exalted irritability) affect the voluntary muscles, but not the sensorium. Delirium is rare, while coma is frequent; paralysis of the limbs is scarcely known (unless there be some anatomical lesion of the brain superadded), while convulsions are frequent.

"The mode in which uræmic symptoms enter on the scene, and the forms they assume, present great diversity.

"Generally they begin insidiously with headache or vomiting, followed by heaviness, indifference, and somnolence. These premonitories may either pass away in a few days without further consequence, or they may be succeeded by general convulsions and coma. In other instances the patient is at once struck down with convulsions or insensibility without any previous warning, or he becomes suddenly blind, or is seized with uncontrollable vomiting.

"The most common of these symptoms is *headache*; few individuals with degenerated kidneys altogether escape it. A sense of heavy weight or compression is complained of over the forehead or vertex. Sometimes the pain is obstinately fixed at the back of the neck, or behind the orbits.

"The *defects of sight* consist either in a dimness of vision (amblyopia) which comes and goes—objects appearing as if veiled in mist; or in rapid and complete, though usually temporary, blindness. The convulsive seizures are often accompanied with temporary loss of sight, which generally persists in greater or less degree for a certain time after the spasms have passed away.

"The ophthalmoscope reveals no organic change in the eye in genuinely uræmic amblyopia; it is a purely cerebral phenomenon, and not to be confounded with the hæmorrhagic blindness (Retinitis apoplectica), which is also not uncommon in Bright's disease, and which is due, as V. Graëfe has shewn, to rupture of the retinal vessels. In this latter affection (which is in no sense uræmic) the loss of sight is seldom complete, but it is of a more permanent character. The production of it is probably due to the hypertrophy of the left ventricle which so commonly accompanies a contracting kidney, and the increased tension in the arterial system consequent thereupon; it is an occurrence of the same order as the sanguineous apoplexy to which the same individuals are liable.

"Uræmic *deafness* is much less common than amblyopia, and its occurrence is highly exceptional.

"Uræmic *convulsions* are of the epileptic type, and, as a rule, they conform strictly to that type—being accompanied with complete insensibility, rolling of the eyes, biting of the tongue, and foaming at the mouth. The paroxysm commonly leaves the patient deeply comatose.

"In exceptional instances consciousness is not wholly lost. In a lady under my care the paroxysms coincided with the catamenial periods; during the convulsions the patient knew the persons about her, and called loudly to be held fast. . . . .

"An attack of uræmic convulsions may consist of only a single paroxysm; more frequently there occur a succession of paroxysms or fits, following each other at uncertain intervals of a few minutes or several hours— the patient lying during the remissions in a state

of profound insensibility, with stertorous breathing, pale face, and dilated pupils; or in deep drowsiness, but capable of being partially roused, when spoken to or shaken.

"If a first attack does not prove fatal, it may recur at irregular intervals of weeks or months, or be re-placed by uræmic symptoms of some other order.

"Uræmic *coma* either creeps on very gradually, passing on, in the course of two or three days, into complete stupor; or it culminates quickly—the patient falling down, as if in apoplexy, perhaps while walking in the streets, or occupied with his usual avocations. Cases of this class, when there is no anasarca, and the previous state of the urine is unknown, are very liable to be confounded with apoplexy or with narcotic poisoning . . .

"The *diagnosis* of uræmic coma from apoplexy rests on the absence (in the former) of paralysis, and the partial recovery of consciousness between the convulsive attacks, if there be any. From poisoning by opium, renal coma is distinguished by the dilated or semi-dilated state of the pupils, and by the occurrence of remissions in the insensibility. From ordinary epilepsy the diagnosis—apart from the antecedent history, which, if known, suffices to indicate the nature of the case—is sometimes difficult. The incidents of the seizures are often identical, even to the existence of an aura. As a rule, uræmic fits want the turgid purplish countenance, and asphyxial character of true epilepsy—the face in uræmia being nearly always deadly pale and the breathing easy.

"Dr. Richardson relates the cases of two children poisoned by belladonna berries, in which the symptoms closely resembled uræmic coma, sequential to scarlatina. The insensibility was complete and the pupils strongly dilated. The examination of the vomited matters and of the urine furnishes, in such cases, the best means of diagnosis.

"In all cases of convulsions or insensibility from doubtful causes, the urine should be forthwith examined, and, if necessary, withdrawn by catheter for that purpose. It must not, of course, be forgotten, that sanguineous apoplexy is a not very unfrequent occurrence in chronic Bright's disease.

"Uræmic coma and convulsions may prevail separately; but much more commonly the attacks are of a mixed character, and combine several or all the phenomena just enumerated* . . .

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* It is worthy of remark that the uræmic symptoms in cholera almost always partake of the nature of coma. It is rarely that convulsions occur in the uræmia of cholera. We do not say they never happen, because we have seen a few cases, but only under circumstances when convulsions might be expected to occur independently of the uræmia, as in drunkards, and young children either teething or infested with worms.—Ed. *M. Q. J.*

"As a rule, both the quantity of urine and the excretion of urea diminish notably at the period immediately preceding a uræmic attack. Sometimes, however, very great scantiness of urine, or even total suppression (in acute Bright's disease) may exist without evoking any uræmic symptoms. . . .

"Uræmic *vomiting and diarrhœa* are common phenomena of Bright's disease. The vomiting which occurs in that disease is not, of course, always uræmic. The digestive functions are notably impaired throughout the complaint, and a heavy or indigestible meal may at any time be rejected as in dyspeptic states from other causes. When the vomiting is really uræmic, it takes place without reference to the nature of the contents of the stomach, and is oft repeated or uncontrollable; the vomited matter is a watery fluid, either distinctly ammoniacal to the smell, or (if acid) evolving ammonia freely when caustic potash is added thereto. The alvine dejections are similarly characterized when due to the same cause.

"*Paroxysms of dyspnœa* belong to the least frequent forms of uræmic disturbance—if indeed such attacks have at any time a genuine claim to the designation uræmic. Fournier cites some cases of this kind." * * * *

We have selected the above as an example of the thoroughness with which Dr. Roberts deals with the various subjects comprised in his work. We have omitted the details of cases which are incorporated with the text.

Our space will only permit of one more extract :—

"*General cystic degeneration of the kidneys in adults.*—This is a somewhat rare condition, though most museums contain specimens. There are two very fine examples in the collection of the Manchester Infirmary. In this form of disease the organs are greatly enlarged, so as sometimes to weigh several pounds, and to constitute tumours in the abdomen recognizable during life. Both kidneys are always affected; but not, generally, in an equal degree. The substance of the gland is converted into a mass of closely aggregated cysts, lodged in an abundant matrix of connective tissue. The cysts do not communicate with each other, nor with the calyces—except in rare cases, when some of them suppurate and open into the pelvis. They range in size from a pin's head to an orange, and have walls of varying thickness. Their contents also vary: some contain a limpid yellowish or reddish serum; others a gelatinous substance. The fluid within the cysts always contains albumen, but not urinous ingredients. The interior of the cyst is lined with epithelium; and sometimes blood discs, pus corpuscles, and cholesterine crystals are found within them. In far advanced cases the secreting tissue of the kidney is almost entirely destroyed; more frequently remnants of renal tissue are found in the fibrous

matrix between the cysts and in the pyramidal portions. The pelvis, ureter, and bladder are open and usually healthy. Two or more cysts may become confluent by absorption of some parts of their walls and then an irregular cavity is produced, with fibrous bands or frœna passing from side to side. Queckett attributed the formation of the cysts to dilatations of the Malpighian capsules; but the observations of Dr. Conway Evans, and Dr. Bristowe, on what appear to have been incipient cases, lead to the conclusion that they are formed, as in the congenital cases, by expansions of sections of the uriniferous tubes, and occlusion and atrophy of the intermediate portions. Independent sacs are thus constituted, which at first are so minute that they can only be seen with the microscope, but at a later period they enlarge into visible cysts."

In the museum of the Madras Medical College there is a very fine specimen of this cystic degeneration affecting both kidneys, which are enormously enlarged. The kidneys were presented by Dr. Hunter Adam, and were obtained from a prisoner in the Nellore Jail, who died comatose after a short illness.

We can confidently recommend Dr. Roberts' work as a treatise on which the greatest reliance may be placed, whether in regard to the accuracy and faithfulness of the descriptions of disease, or in respect of the judiciousnèss of the treatment recommended. It does the greatest credit to the Manchester School. The illustrative wood-cuts are faithful representations of urinary deposits, and the work is enriched by the details of numerous cases of the different diseases treated of in its pages. A modern Medical library could scarcely be considered complete if it wanted a copy of this work.

PART III.

MEDICAL MISCELLANY.

No. 9.—*Variola confluens; extensive sloughing; subsequent Pertussis; Abortion in the fourth month of pregnancy; Recovery.* Under the care of Surgeon W. N. CHIPPERFIELD, Ag. Physician, General Hospital. Reported by Assistant Apothecary H. STAGGS.

VATHA VULLEEAMAH, a Hindoo woman, about 20 years old, in her third month of pregnancy, was admitted into the General Hospital, Madras, on the evening of April 8th, 1867. She was in an extremely wretched condition. The friends, who accompanied her, stated that she was attacked with small-pox a fortnight ago, and, judging from the appearances present, she must have been sadly neglected. Being a caste woman, the prejudices of her race prevented her seeking medical advice at an earlier period, and it was not until her relatives believed that the case was quite a hopeless one that they brought her to hospital. The patient's body presented a superficial slough, only slightly broken here and there by thin lines of sound integument, from the forehead to the dorsum of the feet; there were several deep ulcers on her lower extremities, and one on the forehead, infested with maggots; while the natural odour of the disease combined with that due to the extensive sloughing, was sickening in the extreme. She was very feeble, scarcely able to articulate, and had a small, weak, fluttering pulse; she was quite prostrated from the want of rest and the irritation she was suffering.

The patient was placed in the north verandah of the shed attached to the hospital, specially devoted to contagious diseases, with screens so placed as to allow of thorough ventilation without exposure to any direct draughts. The following treatment was pursued:—

℞. Acidi Carbolici, ℥i.
Aquæ Ferventis, ℥xl.—M., ft. lotio.

When cold to be freely sprinkled over the body and clothing of the patient, several times a day.

℞. Ammoniæ Carbonatis, gr. 4.
Decocti Cinchonæ, ℥iss.—M.
ft. Haust.
to be taken every four hours.

℞. Tinct. Hyoscyami ℥ii.
Aquæ Camphoræ, ℥i.—M., ft. haust,
to be taken at bed-time.

As much mutton or chicken broth as she can take; six ounces of wine daily in divided doses.

The maggots, which had burrowed deeply into the tissues, were destroyed by the injection of pure chloroform into the sinuses. Two or three injections were found sufficient for this purpose. [As a practical hint, it may not be out of place to mention here, that chloroform so used for the removal of maggots speedily proves successful, when other applications, such as turpentine, spirits of camphor, &c. fail].

Under the above treatment the patient rapidly and unexpectedly improved. She daily gained strength; the superficial sloughs separated (chiefly by disintegration and without any profuse suppuration); the ulcers healed, and she was progressing favourably, when (twenty days after admission) whooping cough supervened and proved very distressing to the patient, especially at night. She was at once removed to a ward, and the Extract of Belladonna was given in one-sixth of a grain dose every three or four hours; the dorsal region of the spine being rubbed night and morning with chloroform liniment. This treatment afforded very great relief, and the patient was in a fair way towards recovery when, during the night of the 15th of May, she was delivered of a four month's fœtus without having experienced any premonitory symptoms in the way of hæmorrhage or labour pains. The cause of abortion, as assigned by the patient, was fright from having seen some white object about the hospital grounds that night, which she persuaded herself to believe was a veritable ghost! No bad effects resulted from the abortion, and she convalesced rapidly. She was anxious to return home, but was kept in hospital partly on account of the cough of which she had a few paroxysms every night, and partly because the thick

epidermis of the palms of the hands and soles of the feet had died and was separating as a horny cast. She was very importunate to be discharged, and her friends came and begged that she might go, evidently for the purpose of performing some ceremony or vow, but she was recommended to remain until quite well. However, on the 24th of May, she was secretly removed from hospital by her relatives.

No. 10.—*Chronic Gastritis: Anasarca: Death from Perforating Ulcer of the Stomach.* By Surgeon W. N. Chipperfield, Acting Physician, General Hospital.

A. O., a German, Ship's Carpenter, aged 45 years.

An emaciated man of nervo-sanguine temperament, admitted 30th April 1867. States that he left England about twelve months since and was well until within the last three and a half months, when he began to suffer from severe pain in the epigastrium with a sense of oppression in the chest and difficulty of breathing. Soon afterwards dropsy of the legs set in and he became too ill to do his duty. On reaching Madras he was at once sent to Hospital.

Present state.—Extremely debilitated, cannot walk without support; very anæmic, conjunctiva pale, complexion muddy-coloured; expression of countenance very anxious and indicative of intense suffering. Lower extremities, from the middle of thigh downwards, enormously swollen and pit deeply on firm pressure. Has much dyspnœa amounting to orthopnœa, so that he cannot lie down, but sits upon the edge of the bed with his forehead supported upon the back of a high chair. Inspirations very shallow. Very severe pain in the precordial and epigastric regions, where there is exquisite tenderness on the slightest pressure. On percussing the thorax (performed with difficulty on account of its occasioning distress) there is universal dulness both before and behind, somewhat more marked on the right side. A very imperfect anscultation detects harsh tubular breathing at apex of left lung, and the heart's sounds are so plainly heard in the right lung that they completely mask the pulmonary sounds. The heart's action is excited and irregular; no abnormal murmurs. Pulse 110, small, feeble, irregular. Tongue furred. Bowels very irregular, lately constipated, the

stools passed with difficulty. Urine scanty, of pale straw-colour, *sp. gr.* 1010, reaction acid, contains albumen, $\frac{1}{8}$th.

Apply sinapism over heart and stomach.

℞. Olei Ricini., ℥i. directly.

℞. Tinct. Hyoscyami, ℥ii.
Mist. Camphoræ, ℥i. at bed time.

To have broth and brandy-flip in small quantities.

May 1st.—No improvement, had very little sleep, partly from the pain, but chiefly from the distress in breathing. Bowels opened once, stool very solid. The pain is very acute, causing him to moan constantly; the abdominal tenderness is so great that he flinches at the approach of the hand. Pulse much accelerated, very small, irregular and feeble.

℞. Opii gr. i. every four hours.

2nd.—Is evidently sinking. The pain is not so much complained of, as he is drowsy and disinclined to talk. The objective symptoms are as before. Urine only a few ounces, opalescent but quite free from deposit. Albumen about one-eighth.

Omit the opium, continue the nourishment.

3rd.—Passed a very restless night; complains of great pain over *the heart*. Dyspnœa urgent. Was propped up on his cot last night, but finds the sitting posture more endurable. Pulse almost imperceptible, a mere weak fluttering thread. Begged for a purgative this morning as he felt sure a copious evacuation from the bowels would relieve him. Had thirty grains of jalap in syrup.

Begs for something to relieve "the pain at the heart."

Apply opiate epithem, continue brandy-flip.

Vesperi.—Sinking, semi-comatose. Respiration very shallow and rapid.

4th.—Died at 1 A. M.

Necroscopy *at* 8 A. M.—*Body* very much emaciated, some suggillations on sides and back of trunk. Lower limbs very anasarcous. *Head* not examined.

Thorax.—Pleura universally adherent except a small portion at apex of left lung. *Lungs* very œdematous; right, of dark-gray hue, vesicular structure not apparent, non-crepitant, looks like very much soddened wash-leather; left, of same appearance at lower lobe, but crepitant in upper lobe where the texture is more natural, but still œdematous.

Pericardium of natural appearance, cavity contains three ounces of clear serum. *Heart,* of normal size, and firm texture. The walls of left ventricle thicker than natural. All the cavities filled with firm bulky clots, those in the auricles of dark purple hue, but those in the ventricles composed of yellowish fibrine, adherent to the irregualities of the chambers and sending prolongations for some distance into the aorta and pulmonary artery. No valvular disease whatever.

Abdomen.—*Liver* large, somewhat pale, slightly nutmeggy on section. Under surface of left lobe covered with a pultaceous matter. *Stomach* and small omentum covered with a similar material. Upon sponging this away, some flakes of shreddy fibrine are seen on the surface, and on raising the stomach, a small circular perforation is found near the œsophagus, on posterior surface, just below the lesser curvature. Some of the contents of the stomach had escaped from this aperture, forming the pultaceous matter there noticed. No evidence of any active peritonitis exist. Upon opening the stomach, which is somewhat contracted, an oval ulcer is found, the centre of which is perforated, the opening having an area about equal to that of a split pea. The edges of the ulcer are pale, indurated and raised. The mucous membrane is pale, rugous, and covered with thick mucus and the matters taken before death.

Spleen natural.—*Intestines* natural but contracted.

Kidneys.—Rather pale and flabby, otherwise natural.

Remarks.—Although peritonitis from perforation appeared to be a likely cause of this man's sufferings upon admission, yet the complication of the condition of the lungs, the great amount of anasarca, and the albuminous urine, rendered the diagnosis extremely difficult; the prognosis being the only certainty about the case. I regret that a more perfect history could not be obtained, but the man never mentioned the occurrence of hæmorrhage either by vomiting or by stool, and the question was omitted to be put to him;—in fact, his distress was so great that one hesitated to add to it by causing any lengthened statement to be made. Of course the immediate cause of death was the formation and presence of the clots in the heart; but had there not been a perforating ulcer of the stomach, the condition of the lungs was such that life could not have been supported many hours. The stomach is in the Medical College Museum.

No. 11.—*Acute Arsenical Poisoning; Recovery.*—By Assistant Surgeon F. DUCKWORTH, M.D., Acting Civil Surgeon, Tranquebar.

(Communicated by the Inspector-General, Indian Medical Department.)

J. S., Æt. 53 years, Inspector Mofussil Police, 34 years service, 33 years in India. Temperament sanguine.

6th May, 1867.—Between the hours of 11 A.M. and 12 noon, I was hastily called to see Mr. S. at his quarters. It was said that he had been suddenly seized with violent sickness. I found him dressed for the purpose of repairing to the Sub-Magistrate's Court, where an important case of *aiding and abetting* escape of prisoners from jail was undergoing investigation, and in which three influential native jail officials were seriously implicated.

Mr. S. was late for breakfast, and was therefore hungry, and partook freely of chicken curry and rice, and drank some cold tea, as was his custom. The curry tasted bad and nauseated him whilst eating, and this induced him to drink some of the tea, but it only made him worse, and within five minutes he vomited three times. On my arrival I found him seated on a chair and vomiting incessantly into a basin. I removed his coat and tie, and promoted emesis by copious draughts of lukewarm water, until the stomach was thoroughly cleared and the water came out quite clean. The patient became very faint and prostrate, and he was therefore undressed and put to bed, and warm spiced brandy and water administered with the view of rousing him and of sustaining the circulation which was flagging. The brandy was rejected. The stomach was again cleared out several times by diluents. He felt a burning pain in the epigastrium and along the course of the œsophagus, and a strong metallic taste in the mouth, described as coppery. Cold sweats broke out profusely over the surface of the body, the countenance became dusky, the respiration hurried, and the voice weak and husky, whilst the pulse was small and scarcely perceptible. The temperature of the body rapidly fell, and this was succeeded by violent and increasing cramps in the calves, and both the upper and lower extremities became rigid and painful with spasms. Soon after, the whole of the muscles of the body suffered excruciating spasms, and the patient was in great agony and expressed himself as if dissolution were at

hand. All these symptoms were fully developed in three hours' time.

The stomach continuing highly irritable and rejecting everything that was administered either as antidotes or as stimulants, in order to keep up the circulation, frictions with turpentine and sinapisms were freely employed. The bowels were moved once only, but not purged. The intellect remained perfectly clear, though he was evidently very apprehensive and much agitated and troubled about his family who were absent from him. In this agonized state he resolved to give, and succeeded in giving, his deposition to the Native Magistrate regarding his case and the suspicions he entertained of the diabolical attempt upon his life. At this stage, a few doses of chlorodyne assuaged the irritability of the stomach, and allayed the violent spasms of the muscles.

By the evening (5 P.M.) the spasms abated in violence and frequency, but vomiting continued at intervals.

6. P.M.—Slept a little and awoke somewhat refreshed, but very thirsty and anxious for cold water. Some arrowroot conjee was given cold, and retained. The pulse gradually rose, and the skin was not so cold or damp, Urine suppressed since morning.

Chemical analysis of the suspected fluids.—Some white powder which was taken from the tea used by the patient, and suspected of being either Tartar Emetic or Arsenic, was dissolved in rain-water, and a little of it put into two separate clean test tubes. To the first was added a solution of ammonio-nitrate of silver, which immediately tinged it yellow, and a precipitate of a yellow colour gradually formed. To the second was added a solution of ammonio-sulphate of copper, which threw down a green precipitate, The suspected tea was next put into two tubes and tested, in the manner above described, with the ammonio-nitrate of silver and the ammonio-sulphate of copper respectively, when the characteristic precipitates of the arsenite of silver and the arsenite of copper were obtained ; proving beyond a doubt that the poison used was *white arsenic.*

The bright yellow precipitate from the tea gradually grew darker, from, evidently, the admixture of tannate of silver, which must also have been in solution. The experiment with the tea was repeated next day in presence of the Assistant Superintendent of Police. The *suspected tea* was placed

in one tube and some *fresh plain tea* in another tube. To both was added a solution of the ammonio-nitrate of silver, when the *suspected tea* threw down a bright yellow precipitate of the arsenite of silver which slowly became darkened, from the cause already alluded to. And the *good tea* gave a dark—nearly black—precipitate of the tannate of silver.

Some of the *suspected curry and rice* was given to a full-grown healthy dog, and violent sickness, salivation, and vomiting ensued in ten minutes times, but the dog recovered from its effects within twenty-four hours and is now alive. Some of the *suspected tea* was given to a kitten, which made it sick in a few minutes and the kitten died in about six hours.

7th May, 1867.—The patient slept well. Complains of headache, a bad taste in mouth and soreness in epigastrium and throat, no cramps since last evening, though the limbs feel stiff and painful. Bowels confined. Urine still suppressed.

℞. Olei Ricini ℥i.
Aquæ Menthæ ℥ii.—*M*,
To be taken directly.

8th.—The oil was rejected after a few minutes, and the patient has since been much nauseated and sick, vomiting occasionally. Is restless and nervous. Pulse small and weak; skin warmer; passed some bright-coloured urine about 4 P.M. yesterday; felt some cramps in the calves only, relieved by dry friction. No appetite. Took arrowroot conjee at intervals and some chicken broth at noon yesterday.

℞. Rhei Rad. Contrit. gr. 40.
Magnes. Carbon. gr. 20.
Sodæ Carbon. gr. 5.
Aquæ Cinnamoni ℥ii.—*M*.
To be taken directly.

Vesperi.—Bowels have acted several times and dejections were very dark-coloured, offensive and bilious; skin is getting hot and the pulse quickened; headache and feeling of deep pain in vertex.

Apply cold evaporating lotion to head.
To be watched.

9th.—Slept badly the early part of the night, and about

2 A.M. he became very nervous, agitated and delirious, suspecting people were about the house plotting against his life. Jumps out of bed suddenly and runs after imaginary objects and stares widely and suspiciously around him, and at every one who makes the slightest noise or stirs. Is incoherent: head hot; no throbbing in temples; pulse quick and soft.

Continue cold evaporating lotion to head.

℞. Tinct. Opii, ℥ss.
Mist. Camphoræ, ℥ies.—*M.*

This draught composed him and procured sleep in a short time, and he awoke this morning about 7, more calm and collected and free from incoherence, though still very timid and nervous. He speaks about some unaccountable dread that he feels. Is suspicious of the natives about him without cause, but is reassured by a little reasoning with him. Head not hot; pulse quiet.

Omit Lotion.

10*th.*—Passed a better night. Is free from delirium, but continues very nervous and suspicious. Removed into the adjoining house which was untenanted, and seems quieted in some of his apprehensions and dread of impending danger. Complains only of sore mouth and pain on pressure in epigastrium. Bowels opened last evening; stools very offensive and bilious. Urine light-coloured and more copious. Skin cool.

Alum Gargle.

Diet:—Arrowroot and rolong conjee, broths and jelly.

N.B.—On the evening of the 9th instant, at the request of the Magistrate, I directed the recovery of the buried rice and curry, and tested each separately. The rice and curry and some of the sand in contact with them were separately washed with care and the fluid strained through thin cloth. To the solutions thus obtained I applied the ammonio-nitrate of silver test, and then allowed the two tubes to stand all night undisturbed. Next morning I found distinct traces of the yellow precipitate and colouration of arsenite of silver in the solution obtained by the washing of the meat and curry; but none whatever in that from the buried rice.

11*th.*—Slept well, and is quite rational and composed this morning. Less soreness in epigastrium, course of œsophagus and mucous membrance of mouth. Eyes a little inflamed and painful. Urine more copious. Bowels not opened since last report.

Alum Gargle.
Draught at bed-time, if required.

12*th.*—Did not sleep quite so well last night. Took no sleeping draught. Feels hungry this morning; has already taken some arrowroot conjee. Still a slight coppery taste in middle of tongue; the organ is foul in the centre, red and excoriated at tip and margins. The mucous membrane of the cheeks and the gums are also sore. Eyes less inflamed, no headache, but a feeling of light-headedness. Cannot stand up for any time. Bowels confined. Skin cool and perspiring in a healthy manner. Pulse 80, soft and regular.

R. Pil. Rhei Comp. gr. 10.
In Pil. ii. at bed-time.

13*th.*—Is improving in every respect. Bowels moved twice by the rhubarb pills. Appetite returning. Is still very weak.

Nihil.

15*th.*—Is gaining strength slowly. No complaints. Appetite returning.

17*th.*—Marked and steady improvement. No pain or uneasiness in head. Tongue clean. Pulse good. Skin and other functions performed naturally. Appetite much improved.

Is recommended for leave for the benefit of his health as he will not be fit for duty for some months to come.

22*nd.*—Has obtained three months privilege leave from his own department. I consider him sufficiently recovered to travel to Bangalore or the Hills by railway.

Discharged from sick report.

No. 106.

"MADRAS, 21st May 1867.

"*From S. J. Wyndowe, Esq, M.D.*, Chemical Examiner,
"To F. Duckworth, Esq., M.D., Acting Civil Surgeon, Tranquebar.

"Sir,—In acknowledging the receipt of your letter No. 19, dated 8th May 1867, I have the honour to report as follows:—
"The box reached me by Banghy with seals intact. It contained, No. I, a small sealed phial, labelled 'Suspected poison in solution.' There was about one ounce of a clear fluid in the phial; in this I detected the presence of arsenic in small quantity. No. II; a phial sealed, labelled 'Poisoned tea,' containing about 3 to 4 ounces of a weak infusion of tea; in this I found arsenic to be present in large quantity."

* * * *

No. 12.—*The Alkaloids of Chinchona.*

Proceedings of the Madras Government, Revenue Department, 19th March 1867.

Read the following papers:—

From the President and Members of the Chinchona Commission, to the Secretary to Government, Revenue Department, Fort Saint George, dated Madras, 28th February 1867.

1. With reference to the Order of Government, as per margin, we have the honour to report that the printing of the tabulated results of the experimental use of Chinchona Alkaloids has occasioned some delay in the submission of a progress report. A considerable number of the tables, however, have now been printed, so as to enable us to estimate, with tolerable precision, the therapeutical effects of the several alkaloids; and, as our President will have no other opportunity of recording his views as to the usefulness of these medicines, the Members of the Commission have decided to conclude now a preliminary report of their proceedings, leaving their more detailed observations to follow when the results of the experiments still in progress are more fully known.

No. 764 of 28th March 1866.

2. In the Tabular Statements, already printed and laid before the Commission, minute particulars in regard to 1,145 cases of paroxysmal fevers treated either by Chinonine, Chinchonidine, or Quinidine, have been registered. These fevers have occurred mostly at stations notedly malarious, such as at Goodaloor in the Wynaad; Sumblepoor and Russelcondah in the Northern Circars; the Godavery jungles; Mysore, Cochin, and Labuan, and may, therefore, be regarded as fair average types of the forms of paroxysmal fever to be met with in the malarious districts of Southern India.

3. A larger number of cases have been treated up to date, but the Returns have not yet been received, or, if received, are not out of the printer's hands, so that the results must be considered in detail hereafter.

4. With regard to the 1,145 cases of fever referred to,

it will suffice to note that they were treated by the alkaloids, as follows :—

By Sulphate of	Chinchonine	...	...	...	410
Do.	Chinchonidine	...	...	...	359
Do.	Quinidine	...	...	..	376

The doses and mode of administration varied a good deal. Some Medical Officers used large doses of from 15 to 20 grains; others, medium doses of from 8 to 10 grains, and some small doses of from 2 to 5 grains. As a general rule, the Members of the Commission are of opinion that the experiments were most successful when medium doses were employed, that is, the cases of fever in which 8 or 10 grains of alkaloid were administered in a single dose daily, appeared to recover more expeditiously than where larger or smaller quantities were employed. Large doses of Chinchonine, Chinchonidine, and Quinidine produce effects very similar to those of Quinine. Disagreeable noises in the head, singing in the ears, deafness, and giddiness are the more noticeable of the symptoms produced by all of the Chinchona alkaloids. Vomiting, nausea, and purging also are occasionally noted to follow their use. On the other hand, small or moderate doses produce none of these peculiar effects, while they improve the appetite, strengthen the digestion, and, in many cases, appear to have a marked effect in reducing the size of congested spleens.

5. The alkaloids were exhibited successfully, that is, with the result of a rapid cessation of febrile paroxysms in a very large proportion of the cases. Out of the 1,145 cases recorded, four deaths occurred, and all these took place at Goodaloor, in Wynaad. Dr. Keess observes of them, that the fever was complicated either with Pneumonia or Diarrhœa, and that a great proportion of his patients were half-starved, emaciated persons, completely prostrated by the malarious influences surrounding them.

In addition to the cases ending fatally, it is recorded that the alkaloids failed more or less to arrest febrile paroxysms in twenty-seven persons—a proportion a little in excess of two per cent. of the total cases treated.

6. In regard to these failures, it must be noted that they occurred chiefly in the practise of gentlemen who tried the alkaloids, not in recent attacks of fever, but in patients whose systems were chronically poisoned by malaria. Thus,

Mr. Walter, of the 4th Regiment N. I., Secunderabad, records of many of his cases, that they had been from one to three or four months suffering from fever before he used the alkaloids, and that in some of them Quinine failed just as much as Quinidine, Chinchonine, or Chinchonidine had done. Mr. Chipperfield explains the probable cause of failure in his Report (Appendix III). In recent attacks of uncomplicated paroxysmal fever, the new alkaloids appeared to most of the Medical Officers using them, and to the Members of the Commission, to be quite as efficacious in the curing of fevers, as Quinine. On this subject, however, it is impossible to speak with precision, until the results of treatment with the chemically pure di-sulphate of Quinine, as supplied by Messrs. Howards, have been tabulated in the form used for recording the treatment by the other alkaloids. Instructions have been issued to the gentlemen engaged in the experiment to do this, and the returns, when received, will afford most valuable data whereby to compare the relative therapeutical effects of the several alkaloids.

7. The evidence, so far as it has come before the Commission, does not go to shew any particular superiority of one alkaloid over another.

The Sulphate of Quinidine is, perhaps, the one regarding which there is the least difference of opinion as to its merits. All three are undoubtedly anti-periodic, and capable of controlling paroxysmal fevers, the Sulphate of Chinchonine in *large* doses perhaps causes more unpleasant symptoms than the others; but on this point further evidence is still wanting to enable the Commission to offer a positive opinion. As regards the general and practical question at issue, we agree with Dr. Keess in thinking that all three alkaloids are, equally with Quinine, capable of controlling paroxysmal fevers. Dr. Keess' experience led him to conclude that a 10-grain dose of either salt, would check or postpone the febrile paroxysm in a considerable number of cases, while very few patients required more than a second 10-grain dose to subdue the disease for the time being.

Other observers have employed larger quantities of the several drugs; but it is by no means clear to the Commission, that the quantities exhibited were, in all cases, necessary to check the fever. As regards this part of the inquiry,

it is intended to institute a distinct series of experiments for the more accurate comparison of the value of the several alkaloids, when contrasted with Quinine, or with each other.

8. The main conclusion which the Members of the Commission have derived from the data before them, is that the alkaloids hitherto but little valued in medicine, are scarcely, if at all, inferior as therapeutical agents to Quinine.

What the exact differences may be in their physiological and therapeutical action, is a question the answering of which may fitly be deferred until more data have been collected in reference to the new alkaloids. The differences, however, will most likely be found to be of degree, rather than of kind, and practically, so far as the wants of India are concerned, it will be just as well that the locally grown barks yield a large proportion of one alkaloid as of another.

9. So impressed are we of the value of these hitherto despised alkaloids, that the Members of the Commission are unanimous in considering that, in the public service of this country, they may very advantageously be substituted in part for Quinine. If three pounds of Chinchonine can be obtained at the price of one pound of Quinine, we consider that a great public good would result from the purchase of the larger quantity, as it would enable the Officers of the Medical Department to benefit a much larger number of the population than they can now afford to treat by prescribing Quinine. Arrangements will be made by Dr. Mackenzie to include in the next Medical Indent on the Home Government a requisition for suitable quantities of each alkaloid.

10. We beg to direct attention to the tables, &c. in the Appendix. It gives us much pleasure in testifying that the experiments conducted by Dr. Keess at Goodaloor have been most carefully recorded.

11. Mr. Cornish, Secretary to the Principal Inspector General, in addition to his other duties, voluntarily undertook those of Secretary to the Commission. For the mode in which these duties have been carried out, the Members of the Commission feel that their best acknowledgments are due to that gentleman.

TABLE 1.—*Shewing the results of treatment of paroxysmal fevers by Chinchonine.*

	Name of Medical Officer.	District.	Type of Fever. Quotidian.	Tertian.	Remittent.	Results. Cured.	Failed.	Remarks.
1	Dr. Keess and Mr. Wade.	Goodaloor (Wynaad) ..	170	19	1	188	2*	Large doses produced disagreeable effect; usual dose from 5 to 10 grains daily. Dr. Keess considers the remedy equal to Quinine.
2	,, Foy...	Sumbulpore... ...	31	6	1	38	...	Chiefly 5-grain doses from two to three times daily.
3	,, Cleveland..	Mysore.	38	4	2	43	1†	Dose grains v—xx three times a day. Chinchonism resulted when large doses were given.
4	,, Whitton....	Cochin.....	25	3	...	28	...	Single dose of 10 grains in a few. In most 5 grains before expected paroxysm. Remedy appeared to effect rapid reduction of size of spleen in several cases.
5	,, White, 1st Royals...	Kamptee...	6	...	...	6	...	Small doses of 2 or 3 grains used. Had larger doses been given, the cure would have been more rapid.
6	,, Dougall....	Northern Circars.	14	2	...	16	...	Given in v, x, and xv grain doses.
7	,, Chipperfield	Madras	8	2	Contd.	8	3	In unsuccessful cases the remedy was not continued more than two days, small doses only given.
8	,, Heard	Shemogah, Mysore	2	...	...	2	...	
9	,, Walter.. ...	Secunderbad	18	3	...	17	4	Nearly all Dr. Walter's cases had been a long time under other treatment before Chinchonine was resorted to. They were obstinate intermittents, and did not yield readily to treatment. Many of the cases had "burning of the hands and feet."
10	,, Fitzgerald..	Labuan	14	5	...	19	...	Small doses used which rendered treatment protracted.
11	,, Houston.....	Upper Godavery.	35	...	...	35	...	Chinchonism resulted when repeated large doses were used. Dr. Houston notes that, in the majority of cases, the pulse rose soon after taking a dose of the medicine.
		Total...	361	44	5	400	10	
			410			410		

* Both died from exhaustion.

† Complicated with pneumonia—the remedy was discontinued.

TABLE 2.—*Shewing the results of treatment of paroxysmal fevers by Chinchonidine.*

	Name of Medical Officer.	District.	Type of Fever. Quotidian.	Tertian.	Remittent.	Results. Cured.	Failed.	Remarks.
1	Dr. Keess and Mr. Wade.	Goodaloor..... ...	137	16	1	154	...	These cases were nearly all cured by from one to two doses of 8 or 10 grains.
2	,, Foy...	Sumbulpore... ...	36	5	...	39	2	In the cases of failure Quinine was restored to, but the result is not stated—generally used in 5-grain doses.
3	,, Cleveland..	Mysore.....	24	10	4	38	...	Doses varied from v to xx grains—small doses in a few cases with less immediate effect.
4	,, Whitton ..	Cochin.....	28	4	...	31	1*	
5	,, White, 1st Royals...	Kamptee	...	...	...	...	..	
6	,, Dougall. ...	Northern Circars.	12	3	...	15	...	Given in v, x, and xv grain doses, considered by Dr. Dougall quite equal to Quinine.
7	,, Chipperfield	Madras.....	8	3	1	7	5	Three of the unsuccessful cases were only one day under treatment. See Dr. Chipperfield's remarks in Appendix III.
8	,, Heard... ...	Shemogah, Mysore	11	...	...	10	1	Grains 8 to 10 before paroxysm.
9	,, Walter.. ...	Secunderabad ...	7	1	...	5	3	As regards three cases the results are so vaguely given, that it cannot be said whether the remedy failed or not.
10	,, Fitzgerald..	Labuan.....	18	4	...	22	...	Grains 3, 6, 8, before paroxysm.
11	,, Houston ...	Upper Godavery.	25	1	...	25	1†	
		Total...	306	47	6	346	13	Three doubtful.
			359			359		

* Fever became remittent.
† Complicated with Neuralgia and Paralysis.

TABLE 3.—*Shewing the results of treatment of paroxysmal fevers by Quinidine.*

	Name of Medical Officer.	District.	Type of Fever.			Results.		Remarks.
			Quotidian.	Tertain.	Remittent.	Cured.	Failed.	
1	Dr. Keess and Mr. Wade.	Goodaloor... ...	140	11	2	151	2	Both died, one from exhaustion, one dysentery.
2	,, Foy	Sumbulpore ...	37	6	..	42	1	Chiefly 5-grain doses, three times a day.
3	,, Cleveland	Mysore...	28	5	..	33	...	2 cases result not known. From 2 to 20 grain doses 3 times daily.
4	,, Whitton	Cochin	26	3	..	29	...	Chiefly 5-grain doses. In a few cases 10 grains.
5	,, White, 1st Royals ..	Kamptee.	9	...	...	9	...	3 and 5-grain doses, three times daily.
6	,, Dougall	Northern Circars....	11	4	...	14	1*	5, 12, and 15 grain doses.
7	,, Chipperfield	Madras...	8	..	...	8	...	5-grain doses, thrice daily.
8	,, Heard...	Shemogah, Mysore.	12	..	2	12	2†	Doses 2, 4, 5, and 6 grains.
9	,, Walter	Secunderabad ...	15	1	...	14	2	Some of the cases were successfully treated, hypodermically. The two failures cured by Quinine.
10	,, Fitzgerald...	Labuan...	9	1	...	10	...	6-grain doses.
11	,, Houston	Upper Godavery ...	10	1	1	12	...	Grains v to x, twice a day.
12	,, Henderson...	Bangalore	15	..	...	12	3‡	
13	,, Oswald	Do....	17	2	...	19	...	Grains v to x, chiefly in interval of fever.
		Total ..	337	34	5	365	11	
			376			376		

* In this case paroxysm only mitigated not checked.
† These were cases of remittent fever, and remained under treatment though benefited.
‡ Remedy omitted on account of diarrhœa.

APPENDIX II.

Report on the Chinchona Alkaloids.

1. In obedience to instructions received from the Head of the Medical Department, I proceeded to Goodaloor, south-east Wynaad, and started the alkaloids experiment on the 1st June 1866.

2. When I arrived at Goodaloor, fever was prevailing to a great extent, both there and in the adjoining coffee estates. Owing to the great rush of fever subjects to the Dispensary, I decided on first observing the effects of large doses of the alkaloids.

3. As there were many persons suffering from fever in June, the administration of a single large dose enabled me to take up a larger number of cases, than I would have been able to do, had I begun with small and repeated doses.

4. I first tried Chinchonidine, in doses varying from 10 to 15 grains, and, in a few days, I was pleased to find that it acted as Quinine would have done in similar doses.

5. I next tried Quinidine with similar results.

6. I left Chinchonine to the last, as it was said to be an irritant of the gastro-intestinal mucous surface. I was, however, agreeably disappointed, when I found that it did not cause nausea or vomiting in doses of 10 grains, and that it was as good an anti-periodic as the sister alkaloids.

7. Encouraged by the absence of symptoms indicating gastro-intestinal irritation, I used Chinchonine in fever complicated with diarrhœa, and I am satisfied that it is not an irritant of the stomach or bowels any more than Quinine is, in certain cases.

8. Some of my patients were *out* and *in*-patients of the Goodaloor Dispensary. Others were visited in the bazaar, and in the adjoining coffee estates, from two to six miles distant from Goodaloor.

9. The great majority of my patients were half-starved, emaciated persons, with flabby muscles, dry, dirty, and shrivelled skins, large spleens, bloodless eyes and tongue,

and small atonic pulse. In many of them, languor was so marked that they could, with difficulty, muster up energy enough to reply to questions; and so prostrated were some of them, that they were, with difficulty, induced to take the medicines offered to them.

10. I have not attempted to reduce, to a small compass, the results set forth in the tabular reports, as I hear that this work has been undertaken by the Chinchona Commission; but I beg leave to point out that a 10-grain dose, of all three alkaloids, seemed sufficient to check the return of fever in the majority of cases. Where it failed to check the return of fever, the succeeding paroxysm was generally observed to be less severe. When the paroxysms returned with unabated severity, 15 grains, and then 20 grains were tried. In a few severe cases, I administered, at the onset, 15 or 20 grains.

11. During the four months that I was employed in the Wynaad, 467 cases were treated with the alkaloids. The majority of these were cases of the quotidian type. Bronchitis, congestion of lungs, pneumonia, diarrhœa, dysentery, and anasarca were occasional complications. I may as well add, that these complications did not in the least interfere with the administration of the alkaloids. Where the local affection required special attention, the alkaloids were given with remedies suitable to the complication. I may here add that all three alkaloids appeared to be as efficacious as quinine.

* * * *

(Signed) J. KEESS, M.D., Asst. Surgeon,
Late on special duty in the Wynaad.

MADRAS, *25th February* 1867.

APPENDIX III.

Report on the therapeutic effects of the Salts of the Chinchona Alkaloids.

1. In furnishing the accompanying tabular reports of the therapeutic effects of the Chinchona Alkaloids, as tested at the General Hospital, Madras, I have the honour to state, that in order to draw a more accurate comparison between the salts tested and the Sulphate of Quinine, I exhibited the

former in the same way as I am in the habit of using the latter, viz., I gave the first dose upon the decline of the sweating stage, the second and third doses being given at two-hour intervals. The fourth dose was exhibited at the same hour as the first dose, and so on with the fifth, sixth, and any subsequent doses which appeared to be required.

2. I have been led to form a high estimate of the anti-periodic effects of the Sulphate of Quinidine. This salt was successful in the cure of the eight cases in which it was administered, and it appeared to me to be quite as valuable a remedy as the di-sulphate of Quinine itself. In some respects it seemed superior to Quinine, as in no instance did it produce any of the disagreeable effects termed Chinchonism; in fact, two patients, who were suffering from severe headache, stated that the medicine completely relieved this symptom. I did not observe any injurious effects upon the digestive organs, but rather a favourable action, as appetite was promoted and digestion apparently assisted. In seven cases the Quinidine was given in doses of five grains thrice daily. As these doses were effectual, I continued them. But as a matter of experiment, in case 8, I gave on the 11th of June, one dose of 15 grains on the decline of the sweating stage, and a second dose of 8 grains two hours before the next expected paroxysm. The patient was free from fever for five days, when a relapse occurred. The same plan of administration was followed and with success, for there was no further paroxysm of ague, although the patient remained under observation for Incipient Phthisis, for a period of more than a month.

3. The Sulphate of Chinchonine I would place second on the list as an anti-periodic. It was unsuccessful in three out of eleven cases; but two of these were very unfavourable ones. One, a European Coffee Planter, was suffering from Tænia and general abdominal engorgement, and the remedy could not be pushed in his case, as it produced Chinchonism very rapidly. He had taken a large quantity of Quinine before the Chinchonine was commenced. He was subsequently treated with pernitrate of iron, Kuosso, turpentine, and oil of Male Fern, but he did not pass the head or neck of the Tænia, only a few proglottides. I saw him on September 17th very much improved in health, getting strong and stout, and quite free from fever. The second case, a European (Surgeon of the Ship "Blackwall,") was a relapse.

Three weeks previously he had been cured of an intermittent by Quinidine. (Case 7 in the table.) He was then suffering from Chronic Hepatitis, and had threatenings of Hemiplegia. These symptoms quite disappeared before his first discharge from Hospital on the 19th June. On his second admission it was ascertained that he had been much exposed to the sun, going fowards and backwards among the shipping in the roads. The Chinchonine* failed to arrest the paroxysms of ague, which was subsequently effected by Quinine.

4. The third unsuccessful case was that of a Eurasian lad, whose stomach would not tolerate the remedy. He was subsequently cured by a combination of Diaphoretics with Quinine.

5. Gastric disturbance was produced by the Chinchonine in most of the successful cases.

6. The Sulphate of Chinchonidine appears to me a much inferior anti-periodic to Quinine. It was unsuccessful in five out of twelve cases in which it was employed. I allowed myself to be somewhat prejudiced against the salt when I commenced its use, as it almost always produced nausea.

7. In cases 1, 8, and 9, it was decidedly successful. Case 2 might be removed from the table; the man was saturated with malaria, and had previously been treated by Quinine and by Chinchonine.

8. Case 3 was a complicated one; the woman was the subject of Hysteria, and each cold stage was accompanied by violent hysterical fits. Her spleen was much enlarged, and, altogether, it was a most unfavourable case for even Quinine. Deobstruents were freely used, even whilst taking the Chinchonidine. She is entered as having been successfully treated by the Chinchonine (Case No. 10 in the table). The fact is, there had been no paroxysm for two or three days whilst taking the Chinchonine, and as that salt was exhausted, she simply passed to the Chinchonidine. She has since had relapses, and has been treated by Quinine and Deobstruents. She was discharged at her own request

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* Only ℥ss. given.

on the 31st August, but since then has had a relapse and has again come under treatment.

9. Case 4 might be removed from the table; he had only one dose of Chinchonidine which increased mental delusions as Quinine had done before. He is still under treatment, occasionally getting a paroxysm of ague with very profuse sweating. He is improving under mineral acids, and his distressing mental delusions have disappeared.

10. In case 5, the remedy produced violent vomiting, and it was discontinued at the patient's request. The same remark may be made as to case 6, subsequently cured by Quinine. Cases 1 and 12 were very mild cases which would probably have been easily cured without any Chinchona preparation. In case 10, nine grains of Chinchonidine appeared to prevent the recurrence of a paroxysm. The patient, a very anæmic female, was subsequently cured by ferruginous remedies.

(Signed) W. N. CHIPPERFIELD, Asst. Surgeon,

Acting Physician, General Hospital.

MADRAS,
18*th September* 1866.

From the Inspector General, Medical Department, to the Secretary to Government, Revenue Department, dated Fort Saint George, 8th March 1867, No. 84.

1. In continuation of this Office letter No. 372, of 11th October 1866, I have the honour to forward, for submission to the Home Government, a copy of each of the tabulated reports received printed since that date, of the therapeutic effects of the Chinchona alkaloids received from England for experimental trial.

2. The Report and tabulated statistics, received up to the end of February by the Chinchona Commission, have already been submitted to Government.

LIST.

	Chinchonine.	Chinchonidine.	Quinidine.	Chinchona leaves and bark.	Report.
Dr. Chipperfield, General Hospital, Madras.	1	1	1	...	1
Dr. Cleveland, Mysore. ...	1	1	1	...	...
Dr. Dougall, Northern Circars...	2	2	2	...	...
Dr. Fitzgerald, Labuan ...	2	2	1	...	...
Dr. Foy, Sumbulpore ...	3	3	3	...	...
Dr. Heard, Shemogah ...	2	2	2	...	...
Dr. Henderson, Bangalore ..	...	1	1	...	...
Dr. Houston, Doomiguidiem ...	3	2	2	1	...
Dr. Keess, Goodaloor(Wynaad)	3	3	3	1	1
Dr. Oswald, Mysore ...	...	...	2	1	...
Mr. Wade, Goodaloor(Wynaad)	...	1	2	...	...
Dr. Walter, Secunderabad ...	3	3	2	3	...
Dr. White, Kamptee ...	1	...	1	...	...
Dr. Whitton, Cochin ...	2	1	2	1	1
Dr. Miller, Thyetmyoo ...	...	...	1	...	...

ORDER THEREON, 19th March 1867, No. 652.

Miscellaneous.

1. Ordered that these papers be transmitted to the Secretary of State.

2. This preliminary report of the Members of the Chinchona Commission on the results of the experimental use of the Chinchona alkaloids is very satisfactory and encouraging.

(True Extract).

(Signed) W. HUDLESTON,
Secretary to Government.

No. 13.—Mr. Broughton's *First Report on Chinchona grown on the Neilgherry Hills.*

Proceedings of the Madras Government, Revenue Department, 12th April 1867.

Read the following letter from J. Broughton, Esq., Quinologist to Government; to the Secretary to Government, Revenue Department, Fort Saint George, dated Ootacamund, 2nd April 1867 :—

1. I have the honour to enclose a preliminary report on the Chinchonæ of the Government Plantations.

2. I would request permission to proceed on duty to Madras on the arrival of the Government vessel containing my laboratory stores, in order to superintend personally the transit of the same to this place. Any damage to the apparatus would seriously impede my future work.

From J. Broughton, Esq., Quinologist to Government; to the Secretary to Government, Revenue Department, Fort Saint George, dated Ootacamund, 1st April 1867.

1. I have the honour, in the subsequent pages, of submitting such part of the results of my examination of the various products of the Government Chinchona plantations, that possess sufficient interest and definitiveness to be brought under the notice of Government.

2. This examination has been conducted under considerable difficulties, arising from the want of many of the chemical appliances which are requisite for the analysis of Chinchona barks. Notwithstanding the kind assistance I have received from Mr. McIvor and Mr. Batcock on all occasions when the establishment at the Botanic Gardens could supply my wants, much time has been consumed in improvising substitutes for lacking implements, and in making such arrangements as are incident to a new establishment.

Present want of chemical appliances.

3. The greater part of my attention has been devoted to an examination of C. Succirubra. Of all the species yet naturalized in

C. Succirubra.

India, this exhibits the most vigorous growth. It is numerically the most important, since nearly 800,000 plants are now growing in the several plantations. It is, moreover, the bark of this kind that will first find its way into actual consumption. For these reasons the products of the Red Bark trees and the conditions of their occurrence merit an early and careful study.

Marked differences in habit of individual trees.

4. A slight inspection of the more advanced portions of the plantations at Neddivuttum reveals considerable differences in the habit and appearances of the individual Red Bark trees. This has already been remarked by Mr. C. R. Markham, who suggested that these variations in the colouring and habit of the trees might probably be connected with differences in their yield of alkaloids. The accuracy of this conjecture is rendered evident by the results of the analyses of the trunk bark of four trees, which are calculated in per-centages of dry bark, as given below:—

Statement of Analyses.

	I.	II.	III.	IV.
Total alkaloids (hydrated)...	4·85	7·00	6·40	6·4
Alkaloid soluble in Ether (Quinine)..	3·25	4·25	4·75	1·7
Chinchonidine and Chinchonine.....	1·60	2·75	1·65	4·7
Sulphate of Quinine obtained crystallized	3·00	4·00	4·55	1·7

In the above analyses, as well as those given subsequently, the Sulphate of Quinine has been obtained in as pure a state as possible.

Remarks on analyses of of Red Barks.

5. Of No. I. it may be remarked that though the poorest specimen that has come under my notice, it gives at least an equal yield to the best Ecuador Red Barks. Nos. II., III., and IV. are considerably richer. Seven per cent. of alkaloids in the natural (unmossed) bark appeared to me so large an amount that I was led to repeat the ana-

lyses by a different method, which, however, closely corroborated the former results. No. II. owes its richness in alkaloids to the presence of an unusually large amount of Chinchonine, which crystallized from an alcoholic solution with the greatest readiness. No. IV. contained comparatively but a small amount of Quinine, but in its stead a large amount of Chinchonidine, which easily yielded a sulphate not distinguishable by the eye from that of Quinine. In this sample of bark the total quantity of crystalline sulphates obtained was no less than 5·2 per cent. of the weight of the dry bark. All the barks contain a certain amount of quinine apparently not susceptible of crystallization.

Bark of branches.

6. These analyses were made in all cases with the bark of the trunk, which (doubtless on account of superior age) is much richer than that of the branches yielding "quill bark." Some of the latter, which I examined, yielded but three per cent. of alkaloids, from which 1·4 per cent. of crystalline sulphates was obtained.

Yield of alkaloids in bark still probably increasing.

I am of opinion that the foregoing data, compared with those of Mr. Howard's earlier reports, afford grounds for believing that the amount of alkaloids in the barks is still on the increase.

Considerations affecting value of Red Barks.

7. It should be stated that the richness of the Red Barks in alkaloids, though doubtless entitling them to the first place among our Indian barks, is not in many respects a true measure of their intrinsic value for manufacturing purposes. This value depends also on the readiness with which the Quinine, &c. can be obtained in a pure and crystalline form. In this respect the natural unmossed Succirubra bark is at some disadvantage, since its alkaloids are more difficult to obtain in a pure form than those yielded by some other kinds.

Mossed Red Bark.

8. Mr. McIvor's valuable and interesting method of treatment of the barks by mossing has already been fully described by himself. Unfortunately I was unable to obtain a specimen of bark that had been under this treatment for more than six months. A sample of bark of a tree of four years and a

half old renewed under moss, yielded (in per-centages of dry bark) :—

Analyses of mossed renewed Bark.

Total alkaloids (hydrated)	7·10	per cent.
Alkaloid soluble in Ether (Quinine) ...	3·95	„ „
Chinchonine and Chinchonidine	3·15	„ „
Crystallized Sulphate of Quinine obtained	3·45	„ „

9. In this instance the comparative youth of the renewed bark does not permit me to quote so high a per-centage of alkaloids as that found some time since by Mr. Howard in bark that had been longer under treatment.* Nevertheless, the advantages of the mossing process applied to this bark, makes itself at once evident to the worker by the readiness and purity with which the sulphates crystallize. The amount of the latter would be much larger had sulphate of Chinchonidine been included.

Root Bark.

10. An examination of the root bark of C. Succirubra enabled me to corroborate the statement of Dr. De Vrij that it contains a large amount of alkaloids.

The dried bark yielded—

Total alkaloids (hydrated)... ...	6·0	per cent.
Alkaloid soluble in Ether (Quinine)	2·15	„
Chinchonidine and Chinchonine ...	3·85	„
Crystallized sulphate of Quinine obtained	2·00	„

Remarks on analyses.

From the above it appears that the greater part of the alkaloids in this root-bark consists of Chinchonidine and Chinchonine. The former alkaloid occurs in considerable quantity. In no case, however, could the roots be a remunerative source of alkaloids, since their bark is thin, contains 74 per cent. of water, and is laborious to procure.

Leaves of C. Succirubra.

11. The occurrence of alkaloids in the leaves of the Chinchonæ has been the subject of numerous and conflicting statements.

* Government Return, 1866, p. 134.

In order to enquire into this interesting and important point, I worked with four lbs. of the leaves of C. Succirubra.* From these I succeeded in obtaining 3·1 grains of alkaloid, of which about 1 grain was soluble in Ether, and gave a faint indication of Quinine when tested with Chlorine water and Ammonia. From none of the alkaloid obtained from the leaves was I able to obtain a definite crystalline sulphate or oxalate.

Probable value of leaves.

Though I would refrain from advancing a decisive opinion until I have examined the leaves at another period of the year, it appears to me to be probable, from the above examination, that the leaves of C. Succirubra (even in the fresh green state) are worthless as a source of febrifuge alkaloids. They appear to owe their bitterness to the presence of Quinovin, a substance which may probably possess some tonic qualities.

C. Officinalis.

12. Next to the C. Succirubra the most important species we at present possess is the C. Officinalis, whose varieties yield the Crown Barks. The three varieties *Bonplandiana, Uritusinga,* and *Crespilla*, greatly resemble one another, and appear to differ even less among themselves than some individuals of C. Succirubra, of which Botanists recognize but one variety.

Var Bonplandiana.

Of these varieties, *var. Bonplandiana* is the most important, since upwards of 750,000 are now growing on the plantations. This variety also comprises the most advanced trees, whose identity with their name could be considered certain. The trunk

* The method of proceeding adopted was as follows:—The bruised leaves were boiled in a chattie with water acidulated with Sulphuric Acid, and the bitter greenish decoction was separated by drainage and strong pressure through a cloth. It was then concentrated by evaporation, allowed to cool, and made strongly alkaline by the addition of milk of lime. A considerable precipitate was thus obtained, which was separated by filtration and purified by careful washing; then dried at 200 F. and powdered. This powder was then repeatedly boiled with strong spirit, and the alcoholic extracts evaporated to dryness. The residue consisted mainly of a bitter yellow resin. It was boiled with acidulated water (by which but a small proportion dissolved) and filtered. The solution was then made alkaline with Caustic Soda and shaken up in a separator with Chloroform. The Chloroform was then separated, and being evaporated by a gentle heat in a capsule, left the purified alkaloid as residue.

bark of a tree from Dodabetta plantation yielded in the dry bark the following per-centages :—

Analyses of Crown Bark.

Total alkaloids (hydrated).	3·6	per cent.
Alkaloid soluble in Ether (Quinine).....	2·8	,, ,,
Chinchonine and Chinchonidine.....	0·8	,, ,,
Sulphate of Quinine obtain crystallized.....	2·8	,, ,,

The fresh bark contained 66 per cent. of water.

A second specimen of somewhat different habit yielded—

Total alkaloids (hydrated).....	3·8	per cent.
Alkaloid soluble in Ether (Quinine).....	3·0	,, ,,
Insoluble in Ether (Chinchonine).....	0·8	,, ,,
Crystallized Sulphate of Quinine obtained.	2·9	,, ,,

Value of Crown Bark.

Hence it appears that even at their present age the trees of C. Officinalis *var. Bonplandiana* yield a bark of admirable quality, and nearly equal to the fine Calisaya bark of Bolivia. In the last quoted analysis no alkaloids were found, except Quinine and Chinchonine, the latter occurring in but small quantity. I am of opinion that this bark possesses, for manufacturing purposes, certain advantages over the Red Bark, that in some measure tend to compensate for the smaller yield and slower growth of the tree producing it. The Crown Bark yields its alkaloids with greater ease, owing to the small amount of resin and colouring matter with which they are associated.

Mossed Crown Bark.

13. An analysis of similar bark that had been renewed six months under moss yielded—

Total alkaloids (hydrated).....	6·8	per cent.
Alkaloid soluble in Ether (Quinine).....	4·8	,, ,,
Chinchonine and Chinchonidine.....	2·0	,, ,,
Sulphate of Quinine obtained crystallized...	4·1	,, ,,

Increased yield produced by mossing.

This analysis shews that the mossing process, though only applied for six months, has greatly increased the yield of alkaloids in this variety of bark.

14. I would here beg permission to state, without advancing any new hypothesis, such known facts that appear

in a great measure to explain the increased amount of alkaloids produced by mossing the bark.

Deleterious action of light on bark.

The injurious action of light on the Chinchona bark and alkaloids was clearly pointed out many years ago by Pasteur,* a Chemist, to whom our present knowledge of these alkaloids is largely indebted. It is on account of this destructive action of light that he recommended shielding the bark from sun-light while drying ; pure, colourless solutions of the alkaloids are soon coloured brown and partially decomposed by exposure to sunshine. The same change takes place when dry or moist sulphate of Quinine is insolated.

Experimental verification.

15. In order to verify these facts in the climate of the Neilgherries, I prepared from Red Bark pure colourless solutions of each alkaloid and sealed them up in vacuo in glass tubes, in order to eliminate possible oxidation. After three days' exposure to the sun's rays they all became coloured, while similar solutions preserved in the shade remained unaltered. The tube containing Quinine was opened after a fortnight's exposure, and its contents examined. It was then found that a considerable quantity of a dark-coloured resinous substance had been formed, and that much of the alkaloid had lost its power of crystallizing. I would submit that these circumstances are very significant, when applied to the elucidation of the cause of some of the changes occurring in the living bark, and are most suggestive of future experiments in the cultivation of the latter.

Moss does not prevent oxidation.

16. It has been stated that the action of the moss is to protect the alkaloids from oxidation. This is contradicted by the circumstance that moss does not exclude either air or oxygen. It is also incompatible with the fact that the Quinidine produced under moss in Micrantha bark is really a more oxidized substance than the Chinchonine produced in the natural bark when fully exposed to the air.

Natural renewed bark.

17. It appeared to me that an examination of bark that had been renewed by natural processes, without the application of

* Comptes Rendus XXXVI. p. 26, and XXXVII. p. 162. Also Koppe Jahresbericht 1853, p. 419.

moss, would possess considerable interest. It was suggested by a statement in Howard's "Nuera Quinologia of Pavon," and also given on the authority of Ruiz.* I was able to obtain a small quantity of such renewed bark from two Succirubra trees which had been injured and partially stripped of their bark by the falling of a log in October 1864. The renewed bark was thicker than that of the natural bark, measuring 0·19 to 0·22 inches, instead of 0·16 inches, and had replaced itself mainly from the edges of the wound; not from the surface, as is the case in mossed bark, but its analysis gave but five per cent. of alkaloids, of which about 3·25 appeared to consist of Chinchonidine and Chinchonine. Unless, therefore, the effect had been impaired by the lapse of time or the character of the injury, the quality of this renewed bark does not appear to corroborate the statement I have had the honour to cite above.

Rationale of mossing the bark.

18. I would submit that the foregoing facts and considerations render it highly probable that the exposure of the *living* bark to direct sun-light has the effect of diminishing the yield in alkaloids, and hence the advantage of direct protection.

I would beg leave to defer a comparative estimate of the respective values of the three varieties of C. Officinalis till a subsequent report.

C. Lancifolia.

19. Analysis of the bark taken from a plant of C. Lancifolia, two years old, yielded 0·8 per cent. of alkaloids, in which (though but a very small amount of bark was at my disposal) I was able to obtain distinct traces of crystalline sulphate.

C. Micrantha.

20. An analysis of the trunk bark of C. Micrantha of four and a half years old yielded the following numbers, expressing percentages in dry bark :—

Total alkaloids	7·1
Alkaloid soluble in Ether	0·3
Chinchonine	6·8
Crystalline sulphates	None.

* Nuera Quinologia. C. Uritusinga, p. 3.—"They cut off (Don Riopio told me) the whole of the Bark of the trunk of a small tree, leaving only a broad strip so as not to destroy the tree, which gradually replaces its loss; and the second time of cutting the bark is called *cascarillas resecatas*, and esteemed of superior quality."

Value of Micrantha bark.

This large amount of Chinchonine crystallized from solution in alcohol with the greatest readiness and purity, forming splendid crystals 0·18 inches long. Huanuco bark contains usually only about 2·0 per cent. of alkaloid. Should Chinchonine come into use as a febrifuge (as appears not improbable from the experimental results of the Chinchonine Commission,*) this Micrantha bark will furnish a most easy and abundant source. The tree rivals C. Succirubra in rapidity of growth, and the bark at present is 0·17 inches thick. It loses on drying 73 per cent. of water.

Advantages of working with fresh barks.

21. Nearly all the above analsyes were made with the fresh undried bark of the trees. Some preliminary experiments shewed me that the bark in the "green" condition presented several advantages which facilitate its examination for alkaloids. The latter are extracted with far greater ease from the fresh than from the dried and powdered bark; and with much less expenditure of acid and labour, and consequently with diminished risk of error or alteration in composition. I am of opinion that this property of the fresh bark will eventually become of considerable importance. For purposes of quotation, it is of course indifferent whether the analyses are conducted with the fresh or the dried bark, provided the process of drying be conducted with proper care.

Results communicated to Mr. McIvor.

22. I have communicated these and other results of my observations to Mr. McIvor, and have discussed with him various applications to future cultivation. I have had to thank Mr. McIvor for much kind assistance, and also for some valuable information concerning the plantations and their products.

Present success of Cinchona plantations.

23. I trust I may be pardoned for expressing my gratification at finding, from personal examination, that the Government Chinchona plantations offer in their present stage such unmistakeable indications of success.

24. I have the honour to forward by banghy four specimens of alkaloids prepared from Red Bark, and illustrative of the foregoing report.

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* Proceedings of the Madras Government, No. 302 of 1867.

ORDER THEREON, 12th April 1867, No. 855.

1. The Government have perused with much interest Mr. Broughton's very encouraging Report, which will be forwarded to the Secretary of Sate, and communicated, with the recent Report of the Chinchona Commission, to the Government of India and of the other Presidencies.

2. They note with satisfaction Mr. Broughton's testimony to the value of the mossing process introduced by Mr. McIvor, and request that the results may be recorded in all reports of bark analysis when the tree has been thus treated.

3. Mr. Broughton will proceed to Madras on duty on the arrival of the ship containing his apparatus, for the purpose of taking charge of the cases and superintending their conveyance to Ootacamund.

(True Extract.)

(Signed) W. HUDLESTON,
Secretary to Government.

No. 14.—*Madras Mortuary Report for the First Quarter of* 1867. By W. ARNOLD SMITH, M. D., Officiating Secretary, Sanitary Commission.

THE health of Madras during the first quarter has not been altogether satisfactory.

The total number of deaths registered amounts to 3,715, which, contrasted with the mean for ten years of similar quarters from 1857 to 1866 inclusive, gives an increase of 730 deaths to the period under review.

Taking the first quarters of six previous years, as shewn in the margin, we observe that there is still a heavy increase in the mortality of the present year of 518 deaths. The years 1862 and 1863 are the only two years in the above period which show a larger number of deaths.

1861...	2,809
1862...	3,912
1863...	3,783
1864...	3,125
1865...	2,594
1866...	2,960
Total...	19,183
Mean...	3197·1

Contrasting the quarter under review with that which has past, and which was also a sickly one, it is satisfactory to find a decrease in the number of deaths amounting to 112.

The death-rate for the past quarter has been at the annual rate of 33·02 per mille, which must be considered high.

There have been 39 deaths amongst Europeans, of which 11 have been females. This number is 1·6 less than that of the average for the first quarters of ten previous years. Nearly half these deaths has been from miasmatic disease, of which Fever contributes 2, Dysentery 5, Diarrhœa 3, and Cholera 6.

The deaths among East Indians amount to 98, of which the larger proportion is females (54). The deaths amongst this class of the population have increased on the ten-year period by 21·8 deaths. More than half these deaths is from miasmatic diseases, amongst which cholera contributes 23.

Hindoos, from composing the great bulk of the population, make up the greater number of deaths. This amounts to 2,912, the male being 248 in excess of female mortality. The increase of deaths in this class over the ten years' average, amounts to 510·1 deaths.

Mahomedans also show a great increase in the number of deaths, which amounts to 200·4 beyond the average.

The total number registered from this section of the population during the past quarter amounts to 666, of which number 356 are females, or 46 more than the opposite sex.

Taking the last Municipal census* (which it is necessary to say must be received with caution) as the basis of our calculation, we find that the annual death-rate amongst the above different classes of the population has been as follows :—

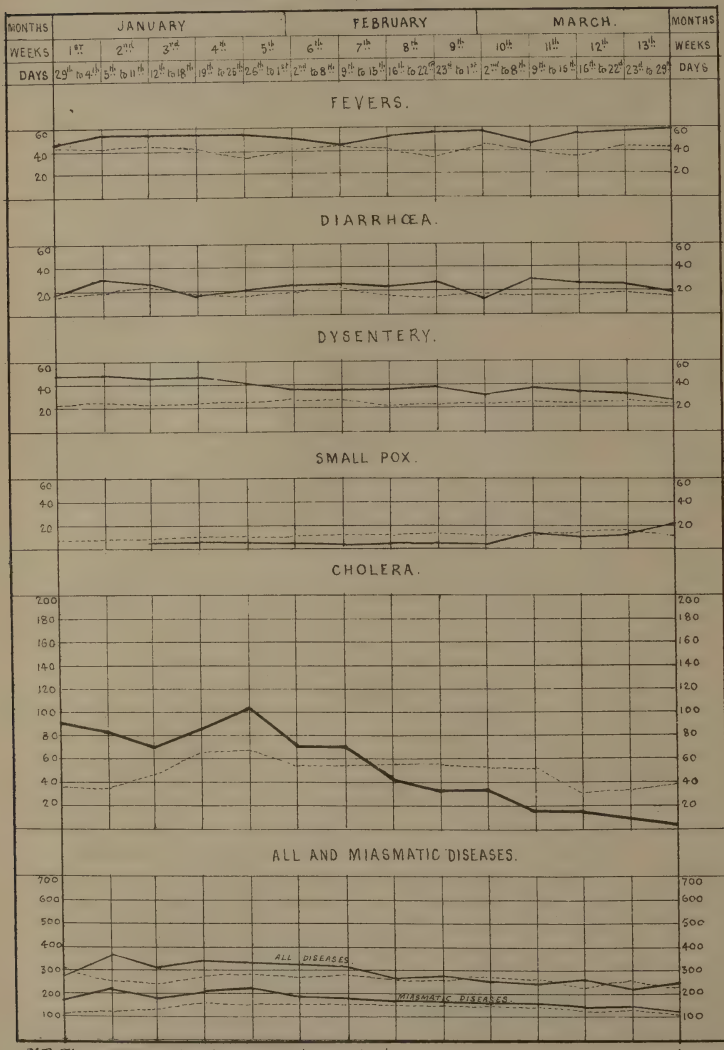
	Per Mille.
European and East Indians.....	28·52
Hindoos.....	33·2
Mahomedans.....	41·6

Putting aside the results given by these figures, there is no room for doubt that the proportion of mortality in the Mahomedan section of the community has been greatly in excess of other classes, which may be accounted for by the unfavourable sanitary conditions of the parts of the town in which the Mahomedans live, and from the abject poverty of the classes who are dependent on the stipendiaries, and upon trades connected with the late Palace.

Looking to the causes of this increased number of deaths over the average for ten previous years, we find that of the

* The population taken by the Municipal Commissioners is said to be 427,771, but as this must be below the real number, 450,000 has generally been taken as a nearer estimate in calculating the death-rate in these Returns. In this instance we adhere to the Municipal census.

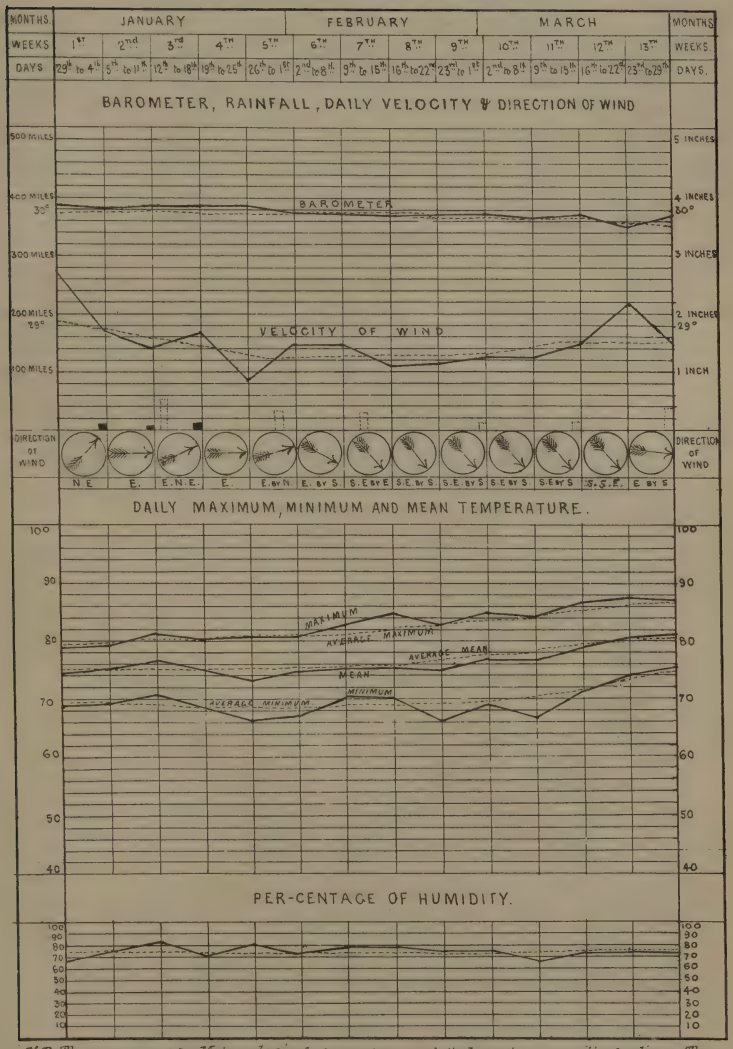
DIAGRAM SHOWING THE MORTALITY FROM MIASMATIC DISEASE IN MADRAS, DURING THE 1ST QUARTER. 1867.



N.B. The total Mortality from each disease during each week is plotted on the perpendicular lines which represent these periods. The horizontal dotted wave lines show the average mortality from each disease for the previous five years.

Mer' Barren: lithog: Madras

DIAGRAM SHOWING THE METEOROLOGICAL CONDITION OF MADRAS, DURING THE 1ST QUARTER 1867.



N.B. The mean weekly Meteorological elements are plotted on the perpendicular lines. The dotted wave lines show the bimonthly average for twenty years from observations kept at the Madras Observatory.

Alex^r Barren. Lithog. Madras

3,715 total deaths registered, 2,183, or nearly three-fifths are from miasmatic diseases.

The latter order of disease shews an increase of 508·6, and other diseases 222·1 deaths on the ten year average.

Miasmatic Diseases.	
1861...	1,387
1862...	2,747
1863...	2,449
1864...	1,701
1865...	1,244
1866...	1,521
Total...	11,049
Average...	1641·5

Taking the mean of miasmatic diseases for the first quarters of six previous years, as shewn in the margin, we observe that there has been an increase of 541 deaths in this order of diseases. A more minute examination of the principal diseases which have made up this order shows us this increase has been chiefly due to fevers and dysentery.

A glance at the Mortality Chart at once brings these facts to the mind as well as other points connected with those diseases which are the chief contributors to the mortality of our crowded native cities.

The number of deaths registered under the head of fevers has amounted to 697, which is 172·2 in excess of the mean for six previous years.

Fevers.	
1861	508
1862...	521
1863...	524
1864...	611
1865...	444
1866..	541
Total...	3,149
Mean...	524·8

The greatest number of deaths registered in any one week has been 59, namely, for that ending February 22nd; and the least number (45) in the week ending March 8th.

A glance at the chart shows how steadily the wave line of death keeps above the average for the whole quarter, only approaching it once in the sixth and tenth weeks. The deaths are in excess of those registered last quarter by 35.

The deaths registered from diarrhœa amount to 277, or 45·2 above the average. The greatest number of deaths (29) registered in any week from this cause was that ending February 8th, and the minimum number (15) on the 1st March.

Diarrhœa.	
1861...	165
1862...	232
1863...	265
1864	216
1865..	246
1866..	267
Total...	1,391
Average...	231·8

It will be observed that the wave line of deaths from this cause only falls below the average on too occasions, namely, in the third and ninth weeks. These deaths show a decrease on last.

The total deaths registered from dysentery amount to 484 or 169·5 deaths above the average. A probable cause for the increased mortality from this and the former disease is to be found in the fact that a large quantity of new rice was introduced into the market during the past quarter, and being cheaper, was doubtless purchased and partaken freely of by the poorer classes of the population.

Dysentery.	
1861...	318
1862	272
1863..	338
1864...	350
1865...	272
1866...	337
Total...	1,887
Mean...	314·5

This kind of rice, it is well known, is very indigestible, and if eaten largely of, is certain to produce derangement of the bowels. Such an article coming into the market immediately after a season of great scarcity, was doubly dangerous to those who were reduced in health and strength by previous privation.

The greatest number of deaths (47) occurred in the week ending January 4th; the minimum (24) in that ending March 29th.

It will be observed how strikingly the wave line of deaths from dysentery continues to run high above the average, it being only towards the end of the quarter that it commences to fall.

The deaths from this disease are 75 more than last quarter.

There are meteorological causes which may have tended towards the increased mortality from this disease, which are noticed at the end of this report.

The number of deaths registered from small-pox amount to 98, or 56 less than the average. Although this is to a certain extent satisfactory, it is not altogether so great a decrease as we might expect from the increased extension of the prophylactic operation of vaccination. Amongst the first quarters of six previous years, we observe that there are three years, namely, 1863, 1865 and 1866, where the deaths were very few, compared with the past period, and an examination of the chart shows a sudden rise in the last

Small-pox.	
1861.....	204
1862.....	545
1863.....	33
1864.....	108
1865.....	6
1866.....	28
Total ..	924
Average...	154

week of the quarter in the deaths from this disease above the average wave line, which leads us to fear that the month in which we are writing will show an increase of deaths on the average of no small amount. It must, however, be remembered that April is the month of the year in which small-pox attains its maximum with unerring certainty.

A sudden rise in the mortality from this disease occurred in the tenth week ending March 8th, when the deaths rose from 3 to 14, and attained a maximum of 21, in the 13th week ending March 29th.

No death occurred during the first week.

The deaths from this disease are in excess of those of last quarter by 86.

An examination of the Tables shows that the deaths from this disease occurred amongst the different classes of the community, as follows :—

	Ratio per	*Mille* of Population.
Europeans...	}	·31
East Indians. ...	5 }	
Hindoos... ...	82	·23
Mahomedans. ...	11	·17

The total admissions from Cholera have been 600, showing the very slight increase of 16 deaths on the average mortality from this disease, for six similar quarters, as shewn in the margin. Taking, however, four out of the six years, we observe that the mortality is considerably in excess of what it usually is during the first quarter.

Cholera.

1861...	164
1862...	1,139
1863...	1,279
1864	349
1865...	247
1866...	321
Total...	3,499
Average...	583·1

The excessive mortality was chiefly confined to the first six weeks of the quarter, in which period 477 out of the 600 deaths occurred ; during the remaining period the deaths only amounted to 123. These facts are clearly brought to notice by the chart.

In the 4th week ending January 25th, the deaths amounted to the maximum of 104. They fall to a minimum (2) in the last week of the period under review.

There is a decrease of 88 deaths from cholera on that of last quarter.

From Appendix C, it will be observed that the deaths have been registered throughout the quarter, as follows:—

January	364
February	178
March	58

The greatest mortality (118) has occurred in Division IV; 59 of the death being at Saint Thomé, and 31 at Royapettah.

The Mahomedan quarter, Triplicane, has also 55 deaths recorded against it.

It is worthy of record that Chintadrepetta has suffered but slightly from this epidemic outbreak.

In order to obtain an insight into the meteorological condition of Madras for the quarter, an inspection should be made of the diagram attached.

Atmospheric Pressure.

This element has been slightly greater during the quarter than shewn by the average of 20 years, namely, 29·975 against 29·956. No very remarkable variations have taken place, except a fall in the Barometer, which usually takes place about the 5th week on the change of the wind from north-east to a south-easterly quarter. A reference to the 1st Quarterly Chart for 1866 shows a similar, although a more marked change at this period.

The barometer stands above the average during the greater part of the first and latter half of the quarter.

Temperature.

The wave line of maximum temperature has been above the average the whole quarter, while that of the maximum crosses and re-crosses the latter five different times.

These two elements have been 83·7 and 69·9 against a mean of 83·2 and 70·2 respectively.

The mean temperature has been 76·5 against the 20 years' mean of 76·9 showing, on the whole, a slight decrease in the heat of the atmosphere.

An examination of the chart shows those points of the quarter where there was a rise or fall in the thermometer.

These changes occur in the 2nd, 4th, 6th, 8th, and 11th weeks, after which there is a sudden rise in the temperature, to the end of the quarter. These are points with which it

is interesting to compare the increment and decrement of the mortality.

Humidity.

With the exception of the 10th and 11th weeks, the wave line of humidity is above the average during the whole quarter. At the above periods, the line makes a sudden dip corresponding to a fall in the temperature.

The average percentage of humidity has been 76·4, being 9° above the average. Some variations in the wave line of humidity occur at the commencement of the quarter in the 2nd and 4th weeks, when it attains a maximum of 82 and 83 per cent. respectively.

Prevailing Wind.

The wind has blown, as usual, at the time of the year under review, from a north-east quarter during the first five weeks, when it changed to a south-easterly one for the remainder of the quarter.

These turning points in the prevailing winds are interesting, when examined in connection with the chart of mortality.

The mean velocity of the wind has been 142·7 miles daily, being an increase of 3 miles on the average for past years.

Sudden variations are noticed in the course of the wave line of this element in the 1st, 4th, and 12th weeks. In the first of these periods, the velocity falls from 250 to 171 miles, and in the 4th week from 167 to 99; in the last period mentioned, it rises from 151 to 206, and as suddenly falls to 149 miles.

Rain fall.

The only rain which has fallen during the first quarter was registered during the first three weeks, amounting to ·17 inches. The twenty years' average rain-fall for this quarter is 1·7.

It has been before noticed there is a general tendency of the wave line showing the deaths registered under the head of fever, to follow the wave line of temperature, showing therefore that an increase of temperature seems to affect unfavourably the mortality from this class of diseases.

The wave line of Diarrhœa shows an opposite course to that of Fever, and attains its maximum and minimum points at different periods. A marked fall in this disease

occurs in the 9th week, which is characterized by a rise in the temperature.

Both deaths from Dysentery and Diarrhœa rise in the tenth week ending March the 15th in a very marked manner, corresponding to a fall in the temperature, with a decrease in the percentage of humidity.

The changes in the velocity of the wind is a meteorological element of great interest in the comparison of climate and disease, as upon its action depends the thorough ventilation of over-populated towns and crowded dwelling houses.

It has been noticed by more than one observer that the deaths from diseases increase numerically during those parts of the year which are characterized by close sultry nights and periods when the air may be said to stagnate over localities thickly populated.

In examining the wave line of cholera and contrasting it with meteorological elements, we might naturally expect to find the deaths increasing with decreased ventilation, that is to say, with a stagnating atmosphere ; but any such theory must be at once rejected when practical illustration of the real state of things is placed before us.

Going back to the diagrams which have accompanied these Reports, during the year 1865, it is observed that there is no connection whatever between the wave line of deaths from this, and the daily motion of the atmosphere, as an examination of these elements shews, that from the 1st of January 1865 to the 31st March 1866, the two wave lines have taken the same direction in 32, and a different one in 29 instances, which seem to lead to the conclusion at present this element has nothing whatever to do with the prevalence of this mysterious disease in Madras.

It is worthy of record in connection with this and other meteorological elements to record the very wide-spread epidemic of influenza which took place amongst horses at the Presidency, but which reached its height about the 12th week of the quarter ending March 22nd, corresponding to an increase observable in Fever and Dysentery, in the population of Madras.

In a communication from the Government Astronomer on the subject, we are informed that during March the *solar* heat* was far above the average, while the shade tempera-

* "Owing to scarcity of solar spots?"

ture was about the usual average; but the grass minimum (that is a thermometor placed on the ground outside) was extraordinarily low. Long shore winds blew throughout this period, and a stagnation of the air generally took place from midnight to sunrise, being succeeded by a sudden rise in the wind about 8 A.M., just two hours after the most chilly part of the night *ground* cold.

The following tabular statement, which has been kindly furnished by Mr. Pogson, shews the excesses and defects of the mean half-monthly sun and grass thermometers, and the state of the wind.

1867.	Radiation Thermometer.		Anenometer.	
	Sun above average.	Ground below average.	Midnight to 8 A.M.	8 A.M. to 6 P.M.
March 1st to 15th.	6°·8	5·1	2 miles from S.S.E.	9½ from S.E.
March 16th to 21st.	8°·1	0·2	3 miles from S.E.	11 from S.E.

These effects, as Mr. Pogson states, are all marked enough about the period of the above epidemic (March 22nd), and effects of these meteorological elements upon horses might be as follows.

The animals exposed to and worked in sunshine would get over-heated during the day. The stagnation of the air at night from midnight to sunrise would keep up their over-heated state, and the sudden rise of the wind about 8 A.M. would be quite sufficient to the wide-spread epidemic, and would be more severely felt in those stables which are freely exposed to the wind.

These facts must be taken into consideration with the increased mortality which has been observed in Fever and Dysentery, when we remember the exposure suffered by the poorer classes to the sun's heat during the day, and their position on the cold ground at night.

APPENDIX A.

Deaths in Madras for First Quarter, 1867.

	Europeans.		East Indians.		Hindoos.		Mahomedans.		Total.		General Total.
	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	
Small-pox	...	...	3	2	38	44	5	6	46	52	98
Fevers	1	1	7	7	311	301	29	40	348	349	697
Dysentery	4	1	1	4	205	189	34	46	244	240	484
Diarrhœa	2	1	3	2	114	103	20	32	139	138	277
Cholera	4	2	11	12	215	207	62	87	292	308	600
Other Miasmatic diseases ...	...	...	...	1	9	5	9	3	18	9	27
Total Miasmatic diseases ...	11	5	25	28	892	849	159	214	1,087	1,096	2,183
Total of all other diseases ...	17	6	19	26	688	483	151	142	875	657	1,532
Total...	28	11	44	54	1,580	1,332	310	356	1,962	1,753	3,715
	39		98		2,912		666		3,715		
Mean Mortality of ten first quarters from 1857 to 1866.											
Miasmatic diseases ...	13·2	4·2	17·4	17 8	716·8	646·9	122·0	136·1	869·4	805·0	1674·4
Other diseases ...	17·4	5·8	18·7	22·3	555·1	483·1	105·7	101·8	696·9	615·0	1309·9
Total...	30·6	10·0	36·1	40·1	1271·9	1130·0	227·7	237·9	1566 3	1418·0	2984·9
	40·6		76·2		2401·9		465·6		2984·3		
Increase	...		21·8		510·1		200·4		...		730·7
Decrease	1.6		...		...		...		...		...

APPENDIX B.

Table shewing the mortality from Miasmatic Diseases in the last 13 weeks.

	Jan. 4	Jan. 11	Jan. 18	Jan. 25	Feb. 1	Feb. 8	Feb. 15	Feb. 22	Mar. 1	Mar. 8	Mar. 15	Mar. 22	Mar. 29	Total.
Fevers	53	55	56	57	50	47	55	59	58	45	54	55	58	702
Diarrhœa	28	23	17	20	21	29	23	25	15	26	22	23	19	291
Dysentery	47	44	45	41	39	37	37	40	32	40	36	34	24	496
Small-pox	0	3	6	4	3	2	4	4	3	14	11	13	21	88
Cholera	81	70	82	104	70	70	45	35	35	18	18	9	2	639
Other Miasmatic Diseases.	2	0	1	0	3	1	1	4	5	2	0	3	3	25
Total...	211	195	207	226	186	186	165	167	148	145	141	137	127	2,241

Average of the corresponding weeks for 5 previous years.

Fevers	40·2	43·4	42 6	38·4	41·0	44·8	41·4	37·6	42·4	40·0	38·4	41·6	41·8	533·6
Diarrhœa	20·0	21·0	20·0	19·2	21·4	23·4	18·2	16·8	19·2	17·8	16·6	19·8	17·2	250·6
Dysentery	25·8	23·2	24·4	25·4	27·4	25·6	20·2	23·4	24.2	25·4	22·6	24·4	21·4	313·4
Small-pox	5·2	6·0	8·2	6·2	6·8	12·8	14·0	14·0	11·6	13·0	17·6	18·6	13·2	147·2
Cholera	30·0	43·2	66·6	67·4	58·2	58·0	59·8	59·6	54·6	53·2	32·8	34·6	39·6	665·6
Other Miasmatic Diseases.	2·8	2·6	1·6	2.2	1·8	3·2	3·4	3·6	4·2	4·4	3·0	3·0	4·2	40·0
Total...	132·0	139·4	163·4	158·8	156·6	167·8	157·0	155·0	156·2	153·8	131·0	142·0	137 4	1950·4

Mean Meteorological Observations, for the past 13 *weeks.*

Barometer reduced 32° F	30·004	30·016	30·024	30·031	29·999	29·951	29·939	29·969	29·993	29·939	29·982	29·899	29·980	29·975
Mean Maximum Temperature	79·5	81·8	80·3	80·8	80·6	82·7	84·3	83·6	84·9	84·3	86·4	88·0	87·5	83·7
Do. Minimum do.	69·6	71·0	69·3	66·7	67·9	70·5	70·4	66·9	68·7	67·5	71·0	74·0	75·4	69·9
Do. Temperature	74·5	76·0	74·4	73·0	74·5	76·8	76·8	74·8	76·4	76·8	78·7	80·6	81·4	76·5
Do. Humidity.	76	83	76	82	74	80	80	77·	78	68	74	75	71	76·4
Prevailing Wind	N. E.	E.	E.N.E.	E.	E.byN.	S. E. by E.	S. E. by S.	S. E. by S.	S. E. by S.	S. E. by S.	S. E. by S.	S.S.E.	E.byS	S. E. by S.
Mean velocity in Miles	171	141	167	99	149	146	114	116	124	123	151	206	149	142·7
Rain-fall	0·05	0·03	0·09	...	...	...	...	...	...	...	...	...	...	0·17

Table shewing the Mean Half-Monthly Meteorological condition of Madras for 20 *years past.*

	Half month ending 15th January.	Half month ending 31st January.	Half month ending 14th February.	Half month ending 28th February.	Half month ending 15th March.	Half month ending 31st March.	Average.
Barometer reduced to 32° F	30·004	29·991	29·982	29·958	29·920	29·886	29·956
Mean Maximum Temperature	80·0	80·6	81·8	83·8	85·5	87·5	83·2
Do. Minimum do.	69·1	68 2	69·0	69·7	71·7	74·2	70·3
Do. Temperature	74·6	74·5	75·6	76·9	78·9	80·9	76·9
Do. Humidity.	76	75	75	75	75	76	75·3
Prevailing Wind	N. E.	N. E. by E.	E	E. S. E.	S. E.	S. S. E.	N. E.
Mean velocity in Miles	158	126	134	129	137	150	139·0
Rain-fall	0·64	0.37	0·27	0·05	0·05	0·32	1·7

APPENDIX C.

Deaths from Cholera in each District.

		January.	February	March.	TOTAL.
I. Divn.	Fort Saint George	...	1	...	1
	Black Town or Mootealpettah	19	26	6	51
		19	27	6	52
II. Divn.	Pedoo Naick's Pettah	20	17	9	46
	Uttapolliam	1	1	1	3
	Big Parcherry	4	3	2	9
	John Pereira's Gardens	1	1	...	2
		26	22	12	60
III. Divn.	Triplicane	55	25	6	86
	Poodoopaukum	11	1	...	12
	Fisherman's Pettah	...	...	...	...
		66	26	6	98
IV. Division.	Saint Thomé	59	14	3	76
	Alwarpettah	...	1	...	1
	Royapettah	31	12	...	43
	Meer Saib's Pettah	19	3	...	22
	Kistnampettah	7	1	...	8
	Tanampettah	2	1	...	3
		118	32	3	153
V. Division.	Chintadrepettah	7	6	6	19
	Narasingapooram	7	1	...	8
	Comaleeswapuram	1	1	...	2
	Poodoopettah	3	...	...	3
	Egmore	1	...	...	1
	Chetput	5	...	...	5
	Codumpaukum	...	...	...	...
	Nungumbaukum	22	1	1	24
	Mackay's Gardens	8	4	...	12
	Nagatha Covil	3	...	1	4
		57	13	8	78
VI. Division.	Pereamettoo	2	1	...	3
	New Town	2	1	...	3
	Vepery	4	1	1	6
	Choolay	9	...	2	11
	Gunpowder Mills	...	...	...	...
	Pursewaukum	6	5	3	14
	Kilpaukum	...	...	...	...
	Perambore	6	3	1	10
	Viasarapaudy	..	...	...	...
		29	11	7	47
VII. Division.	Tondiarpettah	1	2	2	5
	Washerman's Pettah	21	30	11	62
	Monegar Choultry	5	3	1	9
	Royapooram	16	11	...	27
	Cashemode	6	1	2	9
		49	47	16	112
	General Total	364	178	58	600

Meteorological Results *from the Madras Observatory Register, for the month of January* 1867.

January 1867.	Barometer reduced to 32°.	Standard Thermometers. Observed extremes. Maxim.	Observed extremes. Minim.	Daily means. Dry.	Daily means. Wet.	Percentage of Humidity.	Wind. Prevailing direction.	Wind. Daily velocity.	Depth of Rain.	General Remarks.
	Inches	°	°	°	°	Per cent.		Mls.	In.	
1	30·004	79·3	69·7	74·9	68·4	72	N.EbyE.	150	.....	Fine.
2	30·030	78·3	67·1	74·2	69·2	78	N.EbyN.	178	0·05	Passing clouds. Shower at [5¼ P.M.
3	30·068	79·2	73·7	75·6	66·3	62	N.EbyE.	261	.....	Chiefly cloudy.
4	30·055	79·5	68·8	79·5	68·7	79	N. E.	129	.....	Chiefly fine.
5	30·041	79·7	69·9	75·1	70·1	79	N. E.	187	0·03	Passing clouds. Shower at [4¾ A.M.
6	30·005	81·1	69·8	75·4	71·6	84	N.E.byE.	143	.....	Fine, with passing clouds.
7	29·990	82·5	70·7	75·6	72·8	88	E	95	.....	Do.
8	29·977	83·7	70·8	76·0	73·3	88	S.E by S.	96	.....	Light clouds.
9	29·993	83·0	71·7	76·5	72·5	83	S. E.	105	.....	Fine, with passing clouds.
10	30·051	80·4	70·4	77·6	71·1	79	E.	149	.....	Passing clouds.
11	30·052	82·1	73·5	77·1	71·7	77	E. N. E.	210	.....	Do.
12	30·010	80·7	73·0	76·9	71·2	76	E. N. E.	286	00·2	Do.
13	29·992	80·2	72·9	75·8	69·3	73	E. N. E.	235	00·7	[fine. Shower at 2¼ A.M. Chiefly
14	30·006	79·1	68·9	74·7	67·5	69	N.EbyN.	176	.....	Fine, with passing clouds.
15	30·040	80·1	67·0	73·6	67·6	74	N.EbyE.	156	.....	Passing clouds.
16	30·030	80·7	67·0	73·2	68·3	78	N.EbyE.	118	.....	Chiefly fine.
17	30·036	80·7	68·2	73·4	68·8	80	E. N. E.	105	.....	Fine, with passing clouds.
18	30·051	80·3	67·8	73·1	69·2	82	E. by N.	90	.....	Light passing clouds.
19	30·081	81·1	68·7	74·3	70·4	83	E. N. E.	104	.....	Fine, with passing clouds.
20	30·076	81·2	69·2	74·5	69·0	76	N.EbyE.	135	.....	Passing clouds.
21	30·038	79·9	68·1	72·5	67·7	79	N. E.	122	.....	Fine.
22	30·032	81·0	66·2	72·9	68·6	88	E. by N	70	.....	Do.
23	30·011	80·4	65·5	72·4	68·7	83	E. S. E.	74	.....	Do.
24	29·999	81·2	63·7	71·7	68·5	85	E. S. E.	98	.....	Do.
25	29·980	81·0	65·4	72·7	69·1	84	S. E.	89	.....	Do.
26	29·989	81·3	66·5	73·4	68·8	88	S.EbyE.	92	.....	Chiefly fine.
27	30·000	81·2	68·5	75·7	69·0	72	E.	148	.....	Passing clouds.
28	29·986	80·5	67·9	75·4	69·0	73	N.E.byE.	195	.....	Fine, with passing clouds.
29	29·997	81·2	67·8	75·4	69·5	75	E. by N.	135	.....	Do.
30	30·010	81·1	69·3	75·0	68·4	72	E. by N.	159	.....	Passing clouds.
31	30·009	79·8	69·1	73·9	67·0	70	N.EbyE.	169	.....	Do.

The Standard Barometer and Thermometers are read at 10 A.M., 4 P.M. and 10 P.M., and the Daily Means are obtained by the application of hourly corrections, deduced from twenty years' observations. The Cistern of the Barometer is 27 feet above the level of the Sea, and the Receiver of the Rain-gauge is three feet from the ground. The Wind and Rain registered are for the current civil day—from midnight to midnight.

N. R. POGSON, *Government Astronomer.*

METEOROLOGICAL RESULTS *from the Madras Observatory Register, for the month of February,* 1867.

February 1867.	Barometer reduced to 32°.	Standard Thermometers. Observed extremes. Maxim.	Observed extremes. Minim.	Daily means. Dry.	Daily means. Wet.	Percentage of Humidity.	Wind. Prevailing direction.	Wind. Daily velocity.	Depth of Rain.	General Remarks.
	Inches.	°	°	°	°	Per cent.		Mls.	In.	
1	30·001	79·8	66·0	72·9	67·9	78	N. E by E.	148	.....	Fine, with passing clouds.
2	29·972	70·7	65·9	73·0	67·7	77	N. E by E.	99	.....	Fine, with passing clouds.
3	29·987	82·1	68·0	76·3	70·9	77	N. E by E.	178	.....	Passing clouds.
4	29·968	82·6	70·9	77·1	72·0	79	E. by N.	153	.....	Cloudy.
5	29·952	83·2	70·4	77·6	73·5	83	E. by S.	190	.....	Chiefly fine.
6	29·932	83·4	72·7	77·9	73·6	82	E. by S.	152	.....	Passing clouds.
7	29·918	84·1	72·9	78·2	73·8	81	E. by S	114	.....	Fine, with passing clouds.
8	29·930	83·1	72·6	77·6	73·3	82	E.	137	.....	Passing clouds.
9	29·957	83·6	72·9	78·2	72·7	77	E. by N.	135	.....	Passing clouds.
10	29·971	83·7	71·6	77·4	73·4	83	E.	88	.....	Passing clouds.
11	29·926	83·9	70·5	76·6	72·9	84	E. S. E.	96	.....	Passing clouds.
12	29·900	84·9	70·3	76·5	72·8	84	S. E.	99	.....	Chiefly fine.
13	29·880	86·0	69·3	76·1	71·4	80	S. S. E.	122	.....	Light clouds.
14	29·953	88·1	69·5	76·2	69·1	71	S. by E.	110	.....	Light clouds.
15	29·983	83·3	68·9	76·7	71·4	78	E. S. S.	145	.....	Chiefly fine.
16	29·965	83·3	68·9	75·0	70·1	79	NE. by E.	92	.....	Fine.
17	29·964	83·7	67·3	75·1	70·4	80	E. S. E.	88	.....	Fine.
18	29·967	84·6	66·9	74·9	70·0	79	S. by. E.	131	.....	Fine.
19	29·962	83·9	67·3	75·0	69·7	77	S.	132	.....	Fine.
20	29·976	83·8	66·5	74·4	68·3	74	S.	125	.....	Fine.
21	29·968	83·5	66·6	74·2	68·2	74	S. by E.	107	.....	Fine.
22	29·979	82·3	64·8	74·9	69·4	76	S. by E.	139	.....	Fine.
23	29·957	84.4	64·9	75·2	71·9	86	S. by E.	150	.....	Fine.
24	29·972	85·5	71·4	78·2	73·4	80	S. S. E.	175	.....	Light clouds.
25	30·019	84·4	71·6	78 5	73·1	78	S. E. by E	147	.....	Fine.
26	30·033	83·4	70·4	76·4	71·8	81	E. by S.	109	.....	Fine.
27	30·021	84·5	69·2	77·6	72·9	83	S. E.	108	.....	Fine.
28	29·997	85·5	69·0	75·4	69·9	77	S. S. E.	73	.....	Fine.

The Standard Barometer and Thermometers are read at 10 A.M., 4 P.M. and 10 P.M., and the Daily Means are obtained by the application of hourly corrections, deduced from twenty years' observations. The Cistern of the Barometer is 27 feet above the level of the Sea, and the Receiver of the Rain-gauge is three feet from the ground. The Wind and Rain registered are for the current civil day—from midnight to midnight.

N. R. POGSON, *Government Astronomer.*

METEOROLOGICAL RESULTS *from the Madras Observatory Register, for the month of March*, 1867.

March 1867.	Barometer reduced to 32°.	Standard Thermometers. Observed extremes. Maxim.	Observed extremes. Minim.	Daily means. Dry.	Daily means. Wet.	Percentage of Humidity.	Wind. Prevailing direction.	Wind. Daily velocity.	Depth of Rain.	General Remarks.
	Inches.	°	°	°	°	Per cent.		Mls.	In.	
1	29·952	86·4	64·9	75·2	63·9	58	S.	106	.....	Fine.
2	29·929	83·7	64·2	74·8	67·9	71	S. by E.	110	.....	Fine.
3	29·961	83·5	66·1	76·6	68·5	67	S.E. by E.	106	.....	Fine.
4	29·981	84·5	68·7	77·7	68·1	62	S.E. by E.	111	.....	Light clouds.
5	29·951	83·3	68·8	76·4	68·2	66	E. S. E.	103	.....	Fine.
6	29·918	83·8	67·0	76·7	70·0	72	S. E.	132	.....	Fine.
7	29·894	85·2	67·5	77·6	70·0	69	S. by E.	155	.....	Fine.
8	29·936	86·2	70·4	78·0	70·9	72	S. S. E.	146	.....	Light clouds.
9	30·002	86·1	70·5	79·1	72·7	74	S. E.	113	.....	Fine, with passing clouds.
10	30·014	86·4	71·9	78·4	71·3	72	E. S. E.	121	.....	Fine, with passing clouds.
11	30·006	85·8	71·2	77·6	70·3	70	S. E.	101	.....	Light passing clouds.
12	29·964	85·9	69·5	78·7	72·5	74	S. S. E.	154	.....	Fine.
13	29·936	86·9	71·6	78·7	73·2	77	S. S. E.	178	.....	Fine.
14	29·977	86·5	71·4	79·2	73·2	76	S. S. E.	196	.....	Fine.
15	29·972	87·2	70·8	78·9	73·0	76	S. S. E.	196	.....	Fine.
16	29·931	86·4	70·9	79·8	73·7	76	S. S. E.	219	.....	Fine.
17	29·909	89·5	73·6	80·7	74·4	75	S. S. E.	206	.....	Fine.
18	29·917	88·3	75·8	80·6	73·8	73	S. by E.	225	.....	Fine day, cloudy night.
19	29·936	87·5	73·1	80·7	73·9	73	S. S. E.	201	.....	Light clouds.
20	29·897	89·8	72·7	80·7	75·3	78	S. S. E.	192	.....	Light clouds.
21	29·838	87·4	76·3	80·9	75·1	77	S. S. E.	208	.....	Passing clouds.
22	29·868	87·0	75·6	81·0	73·8	71	S.E. by S.	194	.....	Light clouds.
23	29·937	87·6	74·8	81·3	73·9	71	S. E.	140	.....	do.
24	29·947	87·5	74·8	81·2	74·1	72	E.	160	.....	Cloudy.
25	29·918	86·8	73·0	79·9	73·7	75	E.	116	.....	Light clouds.
26	29·924	87·1	73·8	80·8	72·7	69	E. S. E.	118	.....	Fine day, cloudy night.
27	29·915	88·4	76·8	81·9	74·5	71	E. by S.	167	.....	Cloudy.
28	29·940	87·7	77·1	82·2	74·5	70	E. S. E.	169	.....	Passing clouds.
29	29·930	87·7	77·4	82·7	75·5	72	E. by S.	181	.....	do.
30	29·895	88·0	77·4	82·8	75·9	73	E.	220	.....	Fine, with passing clouds.
31	29·889	88·8	77·6	82·9	75·2	71	E. by S.	156	.....	do. do.

The Standard Barometer and Thermometers are read at 10 A.M., 4 P.M., and 10 P.M., and the Daily Means are obtained by the application of hourly corrections, deduced from twenty years' observations. The Cistern of the Barometer is 27 feet above the level of the Sea, and the Receiver of the Rain-gauge is three feet from the ground. The Wind and Rain registered are for the current civil day—from midnight to midnight.

N. R. POGSON, *Government Astronomer.*

PART IV.

MEDICAL INTELLIGENCE.

Revised Scale of Medical Salaries.

THE following is the General Order of the Supreme Government, laying down the revised scale of Salaries for Medical Officers in the Indian Service :—

" In continuation of a Government General Order, dated 23rd December 1864, and in accordance with instructions received from the Right Hon'ble the Secretary of State for India, His Excellency the Governor-General in Council has been pleased to lay down a revised scale of consolidated salaries for officers of Her Majesty's Indian Medical Service.

2. The number of medical officers allowed for each Presidency town with its immediate suburbs, and the allotment of duties amongst them, are based on the recommendations of the Commission appointed to take this subject into consideration ; but it will be open to the local Governments to modify the proposed allotment of duties, in such manner as from time to time may seem most desirable, with reference to the convenience of the service, provided the prescribed number of officers and the aggregate of salaries is not exceeded.

3. The appointment of Presidency Surgeons in Calcutta will eventually cease to exist, the duties being performed by the several medical officers holding appointments at the Presidency who are not debarred from private practice. These officers will be required to attend those servants of Government entitled to gratuitous aid, who may seek their services, and also to serve in rotation as members of standing and other medical committees.

4. Present incumbents for these or other appointments which it is proposed to abolish or absorb, will not necessarily be affected at present, and during the gradual introduction of the new arrange-

ments, the cases of any medical officers who are unable to take up the whole of the duties assigned to them, will be individually and specially considered.

5. Officers holding the appointments of Principals of Medical Colleges, Principal Medical Store-keepers, Resident Medical Officers in Colleges and Hospitals, Secretaries and Statistical Officers to Inspectors General, Secretaries Sanitary Commissioners, or Examiners of Medical Accounts, are debarred private practice. This rule will not, however, be enforced in the case of any present incumbents who may have received authoritative permission to engage in such practice.

6. Medical officers holding appointments at the Presidency, and not provided with public quarters, will be granted Presidency house-rent according to relative rank, and on the scale granted to officers of the Staff Corps holding appointments at the Presidency towns.

The grant of Presidency house-rent is limited, however, to salaries not exceeding Rs. 1,400 per mensem.

7. The allotment of civil stations and residency charges to their respective classes will be notified hereafter.

8. In order to render this scale of Indian medical salaries more complete, the salaries of the administrative appointments and regimental charges already provided for in Government General Orders No. 1060 of 1864 and No. 901 of 1866, have been included.

9. Officers of the Indian Medical Service will be on the same footing as military staff officers as regards pay and allowances to be drawn while absent on leave,—the pay of their rank as laid down in para. 29 of Government General Order No. 1060 of 23rd December 1864, being in all cases taken as the basis of the calculation of the moiety due to the absentee and to the officer officiating,—present incumbents being allowed the privilege of receiving, during such absence, either the allowance thus due to them under the military regulations under the revised scale of regimental pay and staff salary, or that to which they would have been entitled under the old scale both of pay and staff allowance.

10. The scale of salaries now sanctioned will be brought into operation from the 13th of November 1866, the date of the receipt of the instructions of the Right Hon'ble the Secretary of State, and be made to apply in all cases where there is no reduction in the present aggregate salary.

11. Present incumbents, whether drawing the old regimental rate of pay with, or the new regimental rate of pay without, staff salary, will have the option of retaining such rates, if more beneficial than those now ordered, except in cases where the salaries have been specially fixed, pending the revision now brought into effect.

ADMINISTRATIVE STAFF.

Appointments.	Presidencies.	Salaries.			
		Surgeon-Major.	Surgeon.	Assistant Surgeon above 5 years.	Assistant Surgeon under 5 years.
		Rs.	Rs.	Rs.	Rs.
Inspector General ...	Bengal ...	...	...	2,700	...
Do do ...	N. W. P.				
Do do ...	Madras.	...	...	2,500	...
Do do ...	Bombay.				
Deputy Inspector General ...	All Presidencies.	...	...	1,800	...
Secretary to the Inspector General.	Bengal...				
Secretary and Statistical Officer to the Inspector General .	Madras.. Bombay.	1,400	1,200	1,000	850
Statistical Officer to the Inspector General ...	Bengal ...	1,250	1,050	850	700
	,, ...	1,400	1,200	1,000	850
Secretary to the Sanitary Commissioner ...	Madras . Bombay.	1,250	1,050	850	700
Military Appointments.					
Principal Medical Storekeeper and Professor of Materia Medica in the Medical College	Bengal ...	1,400	1,200	...	...
	Madras . Bombay .	1,250	1,050	850	700
Garrison Surgeon Fort William...	Bengal ...	1,200		...	...
Do do Allahabad ...	,, ...	1,200	1,000	...	...
Garrison Surgeons at other stations	All Presidencies.	1,050	850	650	500
Garrison Assistant Surgeon when in substantive charge ...	,, ...	...	...	650	500
Garrison Assistant Surgeon when under a Surgeon ..	,, ...	...	...	600	450
Staff Surgeon and Medical Storekeeper ...	,, ...	1,200	1,000	800	650
Medical charge of a Native Regt. With Horse Allowance in Cavalry Regiments of Rs. 90 for a Surgeon Major or Surgeon, and Rs. 60 for an Assistant Surgeon.	,, ..	1,000	800	600	450

Appointments.	Presidencies.	Salaries.			
		Surgeon-Major.	Surgeon.	Assistant Surgeon above 5 years.	Assistant Surgeon under 5 years.
		Rs.	Rs.	Rs.	Rs.
Charge of a Stud Depôt or Remount Agency.	When a substantive charge.	All Presidencies	As Regimental charge.		
			1	1	1
Examiner of Medical Accounts ...		,, ...	A Staff salary of Rs. 400 per mensem with unemployed pay of rank.		
			1	1	1
Surgeon to His Excellency the Commander-in-Chief in India with Medical charge of Head Quarters Staff and Establishments ...			Rupees 1,000		
Principal of Medical College, Professor of Medicine and 1st Physician of College Hospital ...		Bengal ...	...	1,800	.....	.....
Principal of Medical College, Professor of Medicine and Physician to General Hospital ..		Madras	...	1,600		
Principal of Medical College, Professor of Medicine and Physician Jamsetjee Jheejeebhoy Hospital ...		Bombay				
Full Professorships in Medical Colleges with conjoint Presidency duties, viz.						
Second Physician College Hospital, Professor of Medical Jurisprudence, Surgeon to the Mint and Customs ...						
Senior Surgeon College Hospital, Professor of Surgery ...						
Second Surgeon College Hospital, and Professor of Anatomy ...		Bengal...	1,350	1,050	850	700
Ophthalmic Surgeon, Marine Surgeon, and Professor of Ophthalmic Surgery ..						
Obstetric Physician, Professor of Midwifery and Superintendent of Vaccination ...						
Chemical Examiner and Professor of Chemistry ...						

Appointments.	Presidencies.	Salaries.			
		Surgeon-Major.	Surgeon.	Assistant Surgeon above 5 years.	Assistant Surgeon under 5 years.
		Rs.	Rs.	Rs.	Rs.
Surgeon of the General Hospital and Professor of Surgery in the Medical College ...	Madras...	1,250	1,050	850	700
Fort Surgeon with Port and Marine duties and Professor of Anatomy in the Medical College ..					
Ophthalmic Surgeon, Professor of Ophthalmic Surgery and Physiology ...					
Superintendent of Lying-in-Hospital, Professor of Midwifery and Surgeon to the Penitentiary ...	Bombay.				
Second Physician to Jamsetjee Jheejeebhoy Hospital and Professor of Physiology in the Medical College ...					
Senior Surgeon to Jamsetjee Jheejeebhoy Hospital, with Medical charge of the Byculla Schools and Professor of Surgery in the Medical College ...					
Second Surgeon to Jamsetjee Jheejeebhoy Hospital, Surgeon to the Coroner and Professor of Anatomy ...					
Chemical Analyzer to Government and Professor of Chemistry ...					
Occulist, Professor of Ophthalmic Surgery with Medical charge of the Jail and House of Correction.					
Minor Professorships, viz., Botany, Hygiene, Dental Surgery, Medical Jurisprudence, and Comparative Anatomy.	Provided the aggregate salary of the Officers holding the post as an extra charge does not exceed that of a full Professorship with attached duties.	All Presidencies.	Rs. 200 Staff salary.		

Appointments.	Presidencies.	Salaries.			
		Surgeon Major.	Surgeon.	Assistant Surgeon above 5 years.	Assistant Surgeon under 5 years.
		Rs.	Rs.	Rs.	Rs.
Resident Physician College Hospital and Professor of Pathology ...	Bengal.....	.....	.....	.....	800
Resident Surgeon College Hospital and Professor of Physiology ...	Bengal.....	1,250	1,050	.....	.....
Surgeon of the General Hospital...	Bombay....				
Senior Assistant Surgeon, General Hospital, with attached duties ...	Bengal.....	.....	.....	.....	900
Junior ditto ditto ...	,,				
Assistant Surgeon General Hospital, in charge of Out-patients and Professor of Pathology Medical College ...	Madras..	.....	.....	.....	800
Assistant Surgeon General Hospital, and Professor of Pathology in the Medical College ...	Bombay..				
Principal Lahore Medical School and Professor of Surgery and Medicine ...	Bengal	1,400	1,200	.....	.....
Professor of Chemistry and Botany in Lahore Medical School and Chemical Examiner, Punjaub ..	,,	1,250	1,050	850	700
Chemical Examiner, N. W. Provinces ...	,,	1,050	850	650	500
District Surgeons with attached duties, namely,					
1st District, Inspector of Emigrants, Surgeon to Native Infirmary, Leper Hospital, Idiot Asylum, and Black Town Dispensary ...					
2nd District, Surgeon to Female Orphan and Lunatic Asylums, Gun Powder and Gun Carriage Factories and Vepery Dispensary ..	Madras..	1,050	850	650	500
3rd District, Surgeon to Male Orphan Asylum and Chintadrepet Dispensary ...					
4th District, With charge of Triplicane Dispensary ...					
Presidency Surgeons with Professorships and attached duties, viz.					

Appointment.	Presidencies.	Salaries.			
		Surgeon-Major.	Surgeon.	Assistant Surgeon. above 5 years.	Assistant Surgeon under 5 years.
1st, Presidency Surgeon, and Professor of Medical Jurisprudence. 2nd, Presidency Surgeon, and Professor of Midwifery ... 3rd, Presidency Surgeon, Garrison and Marine with charge of Officers' Hospital ...	Bombay.	1,050	350	650	500
Medical Superintendent at Aden ...	Bombay.	...	1,200	...	...
,, at Port Blair ...	Madras.				
Surgeon of the Lunatic Asylum..	Bombay.	1,050	850	650	500
Do. to the Viceroy and Governor General ...	Bengal.	...	...	1,200	...
Do. to the Governor with Medical charge of the Body Guard ...	Madras.				
Do. to the Governor with Medical charge of the Body Guard ...	Bombay.	...	...	1,000	...
Superintendents General of Vaccination ...	All Presidencies	1,250	1,050	850	700
Superintendents of Vaccination ...	,,	950	750	550	400
Medical charge of 1st class Civil Stations. With an extra allowance for charge of Lunatic Asylums, Colleges or Administrative charge of Jails, which will be fixed in the Civil Department.	,,	1,050	850	650	500
Do. 2d do	,,	950	750	550	400
Residency Surgeon. ...	,,	As first or second class Civil Surgeons.			

ALLOWANCES FOR ADDITIONAL CHARGES

In cases where no portion of the Staff salary of the absentee is available.

		Rs.
Medical charge of an extra Native Regiment ...	All Presidencies...	100
,, of extra Wing of a Native Regiment or of a Detachment consisting numerically of not less than a Wing ...	,,	75
,, of a Civil Station by a Regimental Medical Officer, or of a Regiment by a Civil Surgeon, in addition to his own duty ...	,,	100

ALLOWANCES FOR EXTRA CHARGES

Payable wholly to the Officer in actual performance of the duty.

			Rs.
Medical charge of a Store Depôt ...		All Presidencies ...	100
,, of a Stud Depôt ...		,, ...	50
Medical charge of Divisional Staff and Medical charge of Brigade or station Staff	As Stations where there is no "Garrison Surgeon," or "Garrison Assistant Surgeon" or "Staff Surgeon and Medical Storekeeper." ...	,, ..	100
		,, ...	30
Medical charge of a Lock Hospital	1st Class ...	,, ...	100
	2nd Class ...	,, ...	50

H. K. Burne, Lieut.-Col.,

Offg. Secy .to the Govt. of India.

Classification of the Civil Stations of the Madras Presidency, with reference to the preceding Rules regarding Pay of Medical Officers.

Proceedings of the Madras Government, 17th June 1867.

Read the following letter from the Inspector General, Indian Medical Department, dated Fort St. George, 4th June 1867, No. 209.

I have the honor to acknowledge receipt of your Memorandum of 31st May 1867, referring letter No. 1144, dated Fort William, 30th March 1867, from the Officiating Secretary to the Government of India, Military Department, for my remarks, and, in obedience thereto, I beg to submit a list of the civil stations in this Presidency which appear to me to require Covenanted Medical Officers, arranged in two classes, as determined in paragraph 4 of the above letter.

2. In explanation of this list, I have the honor to state that the Madras Government, in their Proceedings and Order thereon, No. 139, of 8th February 1867, have approved of the Medical Officers at Ootacamund being placed "in the 250 Rupees class," for the reason that "the duties of both are as nearly equal as possible;" on this account I am of opinion that both appointments should stand in the same category, viz., the 1st class of the Officiating Secretary's letter.

3. The next nine stations in my list have been similarly classified by the Special Committee—that is, in the 2nd class of their

report, which I presume is to be considered as equivalent with class 1st of the present Despatch of the Government of India.

4. I have transferred Rajahmundry from the 2nd to the 1st class, as its duties are now fully as important as those of any of the other stations in this class. They embrace charge of a Central and District Jail, a Civil Dispensary, Police Hospital, and the usual Head Quarter Civil Establishments.

5. Vellore has not hitherto been a station for a separate Civil Medical Officer ; but, so soon as the Central Jail, now in course of being built, at a distance of about 2½ miles from the Military Cantonment, is completed, the duties cannot be performed by one individual. They will then consist of (for the Civil Medical Officer) charge of the Central Jail, the Garrison Hospital, Civil Dispensary, and Police Hospital, with the establishment belonging to the Session Judge, which will be so extensive as, in my opinion, to justify the station being placed in the 1st class.

6. Thirteen stations fall into the 2nd class ; of these, Cuddapah and Tellicherry are at present held by intelligent and experienced Native Surgeons ; Coconada by an Apothecary ; and Berhampore by a member of the Subordinate Medical Establishment, who is also a graduate of one of the British Universities.

7. Rajahmundry is also at present in charge of an Apothecary ; but, for the reasons already stated in paragraph 4 of this letter, I desire to have a Covenanted Medical Officer posted to it as soon as possible.

8. The exigencies of the Service require that the Native Surgeon at Tellicherry should be sent back to his substantive appointment at Trichinopoly, his place at Tellicherry being taken by an Assistant Apothecary ; but I submit that, so soon as Covenanted Medical Officers are available, Tellicherry, Cuddapah, and Berhampore, from their size and the nature of their duties (having each, in addition to the regular civil establishments, a Civil Dispensary and District Jail), should again become stations for members of the commissioned rank.

9. The other civil stations now in charge of Medical Subordinates are Chicacole and Chetterpore. These and Cocanada may, I think, continue to be so held.

10. I quite concur in opinion with my predecessor that Madras is never, or at all events not for very many years to come, likely to have a large number of Uncovenanted Medical Officers or of graduates of the local University, and that we must, therefore, look to the Medical Subordinate Department for men to hold the more important of our minor charges, as well as to take up the larger civil stations, whenever the necessities of the service may require the withdrawal of their Medical Officers for other duty.

11. The reasons why Military and Civil duties should not, as a rule, be performed by one individual, are so fully stated in Mr. Shaw's letter, under date 20th July 1866, and so I entirely agree in his observations, that, on this point, I have only to state my conviction that the arrangement of uniting both appointments in one Officer is undesirable, and would not work satisfactorily in this Presidency.

12. With reference to paragraph 6 of the Officiating Secretary's letter, and the desire of the Right Honorable the Governor-General in Council for a re-consideration of the necessity for separate Medical Officers for the civil stations of Rangoon and Moulmein, I am aware that Mr. Shaw was strongly of opinion that the civil duties of Rangoon might very well be performed by the Staff Surgeon, as is the case at Bellary and Trichinopoly. But since the Chief Commissioner of Burmah, to whom the requirements of both stations must be best known, is of opinion that the combined civil and regimental duties could not possibly be performed by one Officer, this office has no objection to offer to the nomination of separate Medical Officers for the civil duties ; and I would recommend that Rangoon, as being the larger and more important station, be placed in the 1st, and Moulmein in the 2nd class.

List of civil stations classified as directed in paragraph 5 of Despatch from Officiating Secretary to the Government of India, No. 1144, of 30th March 1867.

1st Class.—Ootacamund.—Two. Coonoor and Kotagherry, Cochin, (Trichoor and Palliport, Calicut); (Leper and Small-pox Hospitals) ; Madura, Coimbatore, Salem, Cuddalore, Vizagapatam, Kurnool, Rajahmundry, and Vellore.

2nd Class.—Chingleput, Cuddapah, Nellore, Mangalore, Masulipatam, Tanjore, Tellicherry, Tinnevelly, Chittoor, Coconada, Guntoor, Berhampore, Tranquebar, and Negapatam.

(Signed) W. MACKENZIE, M.D.

Inspector General, Indian Medical Department.

Fort St. George, 4th June 1867.

From the Accountant General, Madras, to the Chief Secretary to Government, Fort Saint George ; dated Fort Saint George, 31st May 1867, No. 79.

With reference to paragraph 7 of G. O. G. G., No. 370, dated 4th April last, Military Department, re-published in the Financial Notification, No. 2294, of 25th idem, I have the honor to request that I may be informed, at an early date, of the classes into which the several Civil Surgeoncies in this Presidency have been divided. Several Medical Officers have drawn pay at the new rates, which I am unable to check, owing to want of information on this subject.

ORDER THEREON, 17th June 1857, No. 702.

The Governor in Council approves of the classification of civil stations at which Commissioned Medical Officers are to be employed, as proposed in the foregoing letter.

2. The arrangements proposed by Dr. Mackenzie are sanctioned, subject to the confirmation of the Government of India, and with the remark that the Court at Vellore is not a Session Court but a Court of Small Causes.

The British Army Medical Department.

The following Royal Warrant, dated April 1, 1867, revising the pay and half-pay of medical officers of the army, has been promulgated :—

VICTORIA R.—Whereas we deem it expedient to revise and amend the regulations for the pay and half-pay of the medical officers of our army, our will and pleasure is that Articles 283 to 298 of our Royal Warrant of the 3rd of February, 1866, and so much of our Royal Warrant of the 1st October, 1858, as affects the half-pay and retired pay of the said officers, be cancelled, and that instead thereof, this our present warrant be established and obeyed as the sole authority on the matters herein treated of : —

1. The daily rates of pay of the officers of the medical branch of the hospital department of our army shall be as follows : —

Medical Staff—Director-general, special ; inspector-general, 2*l.* ; after 25 years' service, 2*l.* 5*s.* ; after 30 years' service 2*l.* 7*s.* ; after 35 years' service, 2*l.* 10*s.* Deputy inspector-general, 1*l.* 10*s.* ; after 25 years' service, 1*l.* 12*s.* ; after 30 years' service, 1*l.* 15*s.* ; after 35 years' service, 1*l.* 17*s.* Surgeon-major, 1*l.* 4*s.* ; after 25 years' service, 1*l.* 7*s.* Surgeon, 17*s.* 6*d.* ; after 15 years' service, 20*s.* 6*d.* Assistant-surgeon on appointment, 10*s.* ; after 5 years' service 12*s.* 6*d.* ; after 10 years' service, 15*s.* ; after 15 years' service, 17*s.* 6*d.*

Charge Pay—The officer in medical charge of an army in the field, of 10,000 men and upwards, 1*l.* daily ; of 5,000 men and upwards, 15*s.* daily ; of less than 5,000, 10*s.* daily. Or in medical charge of a colony where the number of non-commissioned officers and enlisted men is 1,500 and upwards, 5*s.* daily.

General Hospital Staff—Governor and commandant, staff captain and assistant-commandant, and acting governor, special ; captain orderlies, 6*s.* 6d. per day ; after 5 years' service, 8*s.* ; after 10 years' service, 10*s.*

Apothecaries—Apothecaries, 9*s.* per day ; after 5 years' service, 10*s.* 6*d.* ; after 10 years' service, 12*s.* ; after 15 years' service, 13*s.*

6*d.* ; after 20 years' service, 15*s.* ; after 25 years' service, 16*s.* 6*d.* ; after 30 years' service, 18*s.*

2. Every candidate to be admitted to the competitive examination for a commission as assistant-surgeon in our army, shall be unmarried, and shall possess such a certificate or certificates as would qualify a civilian to practice medicine and surgery in Great Britain and Ireland ; and before receiving a commission shall pass an examination in military medicine, surgery, hygiene, and pathology, after attending the authorized course in a general military hospital.

3. Any assistant-surgeon shall pass such examination as our Secretary of State for War may require, and shall have served on full-pay with the commission of assistant-surgeon for five years, of which two shall have been passed in or with a regiment, or depôt battalion, before he can be promoted to the rank of surgeon.

4. Assistant-surgeons shall, as a general rule, be promoted to the rank of surgeon in the order of their seniority in the service, unless unfit for the discharge of their duties from physical or professional incompetence or misconduct. In cases of distinguished service, however, an assistant-surgeon may be promoted without reference to seniority ; and in such cases the recommendation describing the services for which the officer is proposed for promotion shall be published in the general orders of the army and in the *Gazette* in which such promotion shall appear.

5. A surgeon after 20 years' service in any rank shall be styled surgeon-major, but a surgeon of less than 20 years' full-pay service may be promoted to the rank of surgeon-major for distinguished service. The recommendation detailing the services for which the officer is proposed for promotion for distinguished services shall be published in the general orders of the army, and in the *Gazette* in which such promotion shall appear.

6. A surgeon must have served ten years in our army with a commission on full pay, of which period two years must have been passed with the rank of surgeon in or with a regiment or depôt battalion, before he can be promoted to the rank of deputy inspector-general of hospitals.

7. All promotion from the rank of surgeon or surgeon-major to that of deputy inspector, and from the rank of deputy-inspector to that of inspector, shall be gained by selection for ability and merit, the selection being made from the whole rank of surgeons, whether styled surgeons or surgeons-major, and the grounds of such selection shall be stated to us in writing, and recorded in the office of our Commander-in-Chief.

8. A deputy inspector-general of hospitals must have served five

years at home or three years abroad in that rank before he can be promoted to the rank of inspector-general.

9. Our Secretary of State for War, in cases of emergency, may shorten the several periods of service above mentioned, as he shall deem expedient for the good of our service.

10. Good service pensions shall be awarded to the most meritorious medical officers of our army, under such regulations as shall be from time to time determined by us, with the advice of our Secretary of State for War. Six of the most meritorious medical officers of our army shall be named our honorary physicians, and six our honorary surgeons.

11. Medical officers shall have the right to retire on half-pay, after 20 years' service; medical officers of the rank of surgeon-major, surgeon, or assistant-surgeon, shall be placed on the retired list at the age of 55, and all inspectors-general and deputy inspectors-general at the age of 65 years.

12. Our Secretary of State for War may, when he shall deem it fit, employ officers of the medical branch of our hospital department in sundry situations, at such daily rates of pay, in addition to half-pay, as he shall from time to time determine.

13. A medical officer who having voluntarily resigned his commission has subsequently been permitted to re-enter the army shall not, except under very special circumstances, to be approved by our Secretary of State for War, be allowed to reckon his former service.

14. An Apothecary shall have the right to retire on half-pay after 30 years' good service.

Service on the West Coast of Africa.—15. A medical officer volunteering for service on the West Coast of Africa shall, in order to come under the provisions of the two following articles, serve on the coast for a period of at least 12 months, and shall be governed by the following regulations :—

16. Each year of such service shall be allowed to reckon towards promotion and retirement as two years of ordinary service, but it shall not so reckon towards increased pay or qualification for the rank of surgeon-major. If an officer shall be permitted at his own wish to prolong his stay on the coast, his further service shall be allowed to reckon in proportion.

17. For each year's service on the coast a medical officer shall be entitled to a year's leave at home, and for every additional period beyond a year he shall have an equivalent extension of leave. Non-effective pay.

18. A medical officer placed on half-pay by reduction of establishment, or, on the report of a medical board, in consequence of wounds or ill-health caused in and by the discharge of his duties,

or on account of age (under Article 11), shall be entitled to half-pay at the following daily rates :—*Inspector-General*—After 30 years' service, 1*l.* 17*s.* 6*d.* ; after 25 years' service, 1*l.* 13*s.* 6*d.* ; after 20 years' service, 1*l.* 10*s.* *Deputy Inspector-General*—After 30 years' service, 1*l.* 5*s.* 6*d.* ; after 25 years' service, 1*l.* 2*s.* 6*d.* ; after 20 years' service, 1*l.* 1*s.* *Surgeon-Major*—After 25 years' service, 1*l.* ; after 20 years' service, 16*s.* 6*d.* *Surgeon*—After 15 years' service, 13*s.* 6*d.* ; after 10 years' service, 11*s.* *Assistant-Surgeon*—After 10 years' service, 10*s.* ; after 5 years' service, 8*s.* ; under 5 years' service, 6*s.*

19. The rate of half-pay awarded to officers retiring for their own convenience, after 20 years' service on full-pay, shall not exceed one-half of their full-pay at the time of retirement.

20. Every medical officer who shall retire after service upon full-pay for 25 years shall be granted a rate of half-pay equal to 7-10ths of the daily pay he may last have been in receipt of when thus retiring or proceeding on half-pay, provided he shall have served 3 years in his rank, or shall have served abroad for 10 years in all ranks, or for 5 years with an army in the field. An officer of 25 years' full-pay service whose service falls within neither of these conditions shall be entitled only to 7-10ths of the daily pay he was in receipt of prior to his last promotion.

21. A medical officer placed on half-pay from any other cause shall be allowed only a temporary rate of half-pay (not exceeding the rates specified in Article 18) for such period and at such rate as our Secretary of State for War shall decide with reference to the services rendered to the public by such officer.

22. Medical officers of 20 years' full-pay service placed temporarily on half-pay, under Article 21, on account of ill-health may, however, be allowed to retire on permanent half-pay at the rate fixed by Article 18, if after one year on half-pay they shall be reported by a medical board to be permanently unfit for further service.

23. An apothecary shall be granted pay at the following daily rate, if placed on half pay by reduction of establishment, or on account of age (under Article 14), or through ill-health, certified to the satisfaction of our Secretary of State for War to have been contracted in and by the service :—Apothecary to the Forces, after 30 years' service, 9*s.* per day ; after 25 years' service, 8*s.* per day ; after 20 years' service, 7*s.* per day ; after 15 years' service, 6*s.* per day ; after 10 years' service, 5*s.* per day.

Given at our Court at St. James's, this 1st day of April, 1867, in the thirtieth year of our reign. By her Majesty's commands,

J. S. Pakington.

Mortality of Troops in India.

We take the following from the *Overland Mail* of May 3d :—

"The return of the sickness and number of deaths among the troops serving in India from 1858 to 1865, prepared by the India Office, shows the effect of climate on European, as compared with native troops in each presidency. In Bengal, in 1865, out of an average strength of 38,967 European troops, there were 65,561 admissions to hospital, 913 deaths, including 114 from cholera, and 1,923 invalided. Out of an average strength of 39,891 native troops, there were 68,960 admissions to hospital, 1,098 deaths, including 193 from cholera, and 680 invalided. In Madras, in 1865, out of an average strength of 13,623 European troops, there were 19,433 admissions into hospital, 267 deaths, including 36 from cholera, and 508 invalided. Out of 29,766 native troops, there were 21,367 admissions into hospital, 397 deaths, including 135 from cholera, and 413 invalided. In Bombay, in 1865, out of an average strength of 11,815 European troops, there were 17,625 admissions into hospital, 405 deaths, including 189 from cholera, and 373 invalided. Out of 24,729 native troops, there were 26,339 admissions into hospital, 371 deaths, including 126 from cholera, and 1,015 invalided. The aggregate for the three presidencies was as follows :—Out of an average strength of 64,405 European troops in 1865, there were 102,619 admissions into hospital, 1,585 deaths, including 339 from cholera, and 2,804 invalided; while out of 94,386 native troops, there were 116,663 admissions into hospital, 1,866 deaths, including 454 from cholera, and 2,108 invalided."

We have not yet received the Army Statistical Reports for the year 1864, but in order to compare the foregoing figures with the Returns for the year 1863, we have found the proportion per 1,000 of strength under the following heads :—

Admitted, Died, Invalided, per 1,000 *of Strength in* 1865.

Presidency.	Troops.	Admissions.	Deaths from			Invalided.	Total loss by Death and Invaliding.
			Cholera.	Other Diseases.	All Diseases.		
1865.							
Bengal...	Europeans..	1682·475	2·926	20·504	23·430	49·349	72·778
	Natives. ...	1728·710	7·345	20·180	27·525	17·046	44·571
Madras...	Europeans.	1426 550	2·643	16·956	19·599	37·289	56·889
	Natives. ...	719·512	4·535	8·802	13·337	13·875	27·212
Bombay....	Europeans..	1491·781	15·997	18·281	34·278	31·570	65·848
	Natives. ..	1065·106	5·095	9·907	15·002	41·045	56·047
Total...	Europeans.	1593·323	5·263	19·346	24·609	43·537	68·146
	Natives. ...	1236·052	4·810	14·949	19·769	22·334	42·103

Presidency.	Troops.	Admissions.	Deaths from			Invalided.	Total loss by Death and Invaliding.
			Cholera.	Other Diseases.	All Diseases.		
1863.							
Bengal...	Europeans.	1759·5	3·69	22·57	26·26	33·23	59·49
Madras.....	Do. ...	1254·6	3·72	18·39	22·11	40·09	62·20
Bombay...	Do. ...	1590·8	0·65	15·49	15·14	32·52	48·66
Total...	Europeans.	1634·	3·15	20·49	23·64	34·39	58·03

Comparing the Returns of Europeans for 1863 with those for 1865 there will be found a close correspondence between the admissions and total deaths per 1,000 of strength; the actual result being that in the latter year there were 30 per mille less admissions, with 1 per mille increase of deaths.

Looking a little further into the table it will be seen that the outbreak of cholera in Bombay, producing a mortality of 15·997 per mille in 1865, more than accounts for the increase in the total deaths; for, excluding cholera, the deaths were 1·15 per mille less in 1865 than in 1863.

The Invaliding of 1865 shows an increase of 9·16 per mille over that of 1863, but the term "Invalided" requires some explanation. As given in the above tables it includes all men sent home either for change of air or for discharge, and the returns for 1863 show that not much more than one-half of those sent home are actually discharged from the service; so that it is a mistake to reckon invalids as total losses to the service.

We think the British army in India is to be congratulated upon the figures given above, as they show a very decided improvement in the health and death-rate of the troops. For the Report of the Commissioners on the Sanitary State of the Army in India, May 1863, gives the proportion per 1,000 of admissions into Hospital, from 1800 to 1858, as 2,054, and the deaths as 69, whereas in 1865 the total deaths and invaliding only amounted to a fraction over 68, being 10 per mille more than in 1863.

We must own we were not quite prepared to find that the native army in Bengal experienced so considerable a sickness and death-rate in 1865. A mortality of 27·525 per

mille appears very high for a native army, but probably there is some cause, with which we are not acquainted, to account for this. At all events it does not appear to have led to a proportionate degree of invaliding. During 1865 the Madras troops both European and native, appear to have enjoyed a greater share of health and a less mortality than those of the other presidencies. The invaliding of the native army in Bombay appears high, perhaps "reduction of strength" has led to this.

We trust that when the administrative staff of the British Medical Service in India has got into working order, there will not be quite so much delay in the publication of the Returns; and we hope that the tables furnished by both the British and Indian Department will be constructed on one uniform plan so as readily to allow of comparison.

Madras Medical College: Dr. H. King's Valedictory Address.

The Medical College Anniversary Meeting, on the closing of session 1866-67, was held in the Memorial Hall on Friday evening, 28th June 1867. The Right Honorable the Governor of Madras in the chair. After the reading of the Report and the distribution of the prizes and certificates to the successful students, Dr. H. King, Acting Professor of Midwifery, delivered the following address:—

Your Excellency and Gentlemen,—I regret very much, more even on your account than on my own, that the custom of the College imposes upon me the duty of addressing a few valedictory words to the pupils, who, having completed, so far as it can be completed here, their professional education, are about to enter upon the duties of their lives. To give good advice is proverbially an easy task; but to give it persuasively and effectively is by no means easy, nor can I hope to succeed so well as any of those who have preceded me in the performance of this duty.

Assistant Apothecaries and Hospital Assistants,—You, who are leaving the state of pupilage and entering upon the course of your future career, I congratulate on the successful termination of your preliminary studies. Preliminary only if your teachers have succeeded as they desired and strove to succeed. They have not merely taught you, but taught you how to learn for yourselves. The art which you are to practise, and the science on which your art is founded are essentially progressive. It may be your privilege to

assist in the progress of medicine—it may be your lot to have opportunities of keeping yourselves acquainted with every onward step which the leaders among your brethren are taking every day; —but whether you have the good fortune to be yourselves discoverers or not—whether your own circumstances will be such as to enable you to maintain your own professional knowledge on a level with the improvements and discoveries of the day not—your lives must in any case be passed in study if you will become worthy members of the profession you have chosen. Study of the ever varying phenomena of disease, as modified by endemic or epidemic influences, by idiosyncracy, by treatment; minute observation of the action of each remedy, or combination of remedies you employ; efforts to acquire the power of distinguishing accidential sequences of events from that invariable sequence which constitutes the relation of cause and effect;—these and similar tasks must occupy us all until we cease to heal and can no longer ourselves be healed. Some are more highly gifted than the rest, detecting changes too minute for ordinary perception, and forseeing with almost intuitive sagacity results hidden from their less favored brethren; but even they, well fitted as they are to instruct others, are not less conscious than we of the necessity for unceasing study—not less eager in the pursuit of higher and fuller knowledge. Knowledge has been well defined to be "Belief of what is true on sufficient grounds." Truth is the object of every science; but in ours it is more than ordinarily difficult, and, at the same time, more than ordinarily important, to ascertain the sufficiency of the grounds upon which an asserted "truth" is based. To eliminate the well known fallacy—*post hoc ergo propter hoc*, which doth so easily beset us, which underlies and vitiates so many supposed discoveries in medicine, itself demands the closest and most cautious attention to the phenomena of health and disease. This, however, is but one of many possible illustrations of the fact which I entreat you never to forget; that your studies are not now over, that they will end only with your professional lives.

Of the duties of your positions as merely Medical Subordinates, I do not propose to speak. How these are to be performed, you had an opportunity of hearing in last year's able address. They are summed up in three words—industry, sobriety and obedience. Those duties are to be done, and faithfully; but I do not understand it to be either the intention or the wish of the Government to which you owe your education that you of the warrant grade should restrict yourselves to them. I speak to you, Assistant Apothecaries, therefore, as to those who may and ought to aspire to the independent exercise of your art, in such a manner that it shall not interfere with the efficient performance of your work as Government servants.

The duties of our calling fall naturally under three heads, on each

of which I shall say a few words. Preventive Medicine, the Science of Hygiene, and the Art of what I must call Sanitation, for want of a less barbarous term—is first of these logically, though not first historically, nor until recently first in the estimation of the profession or the public. Of late years the theory and practice of preventive medicine have received a powerful impluse, owing to various causes into which it is unnecessary now to enter; and the effect has been felt in this country no less powerfully, perhaps even more powerfully, than in the West. Already we have not only studied, but learned how to avert disease as well as to cure it, and our efforts have borne goodly fruit. Much, however, still remains to do; and there is not one of you who cannot help in the good work. You can help in two ways—by studying the Hygienic peculiarities of the particular places were your lots may be cast, and, secondly, by exerting all the influence you may possess to spread a knowledge of sanitary principles amongst the people, and to induce them to act upon these principles in the habits of their lives. We are all familiar with strange anomalies in this branch of Medicine. We know of places which *ought* to be healthful, so far as our sanitary knowledge goes, but which *are* foci of disease; of others whose inhabitants live and thrive in conditions which ought to be fatal to health and life; of jails where insufficient and unsuitable food, combined with the absence of anything which can be called ventilation, has appeared to be positively conducive to health and length of days; of hospitals whose situation makes a Sanitary Commissioner but shudder, whose inmates obstinately refuse to realize the anticipations of Hygiene, or the fears of philanthropy, by yielding an exaggerated death-rate. To reconcile these and like incongruous facts with the established principles of sanitary science, by discovering secondary causes interfering with the action of the primary, requires multiplied observations of the meteorological and other circumstances of the localities, from which a modifying law may be reduced—itself applicable to other cases. The power of accurate observation, on which depends your success as physicians, will be no less useful in this than in the curative branch of our profession; but the humblest of us can observe something and record it correctly, and every correctly recorded observation may be a help to a useful generalization. If we cannot all build, we may all collect materials for those who can. And note, that in the course of the inquiries I have indicated, you may often obtain a useful hint from the traditions and beliefs of the people. There will often be some substantial reason underlying an apparently national and unaccountable preference of one site or tank or well to another, which we should suppose equally eligible. Such beliefs may be ill-founded, or may be based upon a condition of things which has passed away; but inquiry into the grounds on which they rest should not be deemed beneath your notice.

In carrying into execution the measures which the established principles of sanitary science enjoin, you can all assist. You have an unbounded field for the exercise in this direction of all the influence which you can exert, by precept and by example. The advantages in point of education, not professional only, but also general, which you have enjoyed, impose upon you additional responsibilities, while they necessarily tend, if you use them a right, to increase your influence upon the uneducated masses amongst whom you will have to work, and to augment, proportionately, your power for good. Remember, too, that in this branch of your duty, your efforts will be made principally among the poor. Not that ignorance of the laws of health and destructiveness and stupid conservatism are confined to the poorer inhabitants of this or any country; but because the rich are exempt from many of the temptations to disregard of sanitary laws to which the poor are open. In no part of your professional duties will you stand in greater need of patience and perseverance, of tact and kindly feeling and good temper, than in your efforts to induce your poorer neighbours to abandon time-honoured habits of aversion to ventilation and drainage, to cleanliness of house and person.

However successful our exertions may be in the cause of Preventive Medicine, we cannot hope—we need not fear—that it will ever supersede Therapeutics. While matter lasts, some of it will be found in a wrong place, constituting "Dirt," according to the well-known definition; and disease and death will be the results as now! though, as we believe, and have good reason for believing, in an ever-diminishing degree. The second branch of your professional duty, then, the treatment of disease, must occupy much, nay most, of your attention and your time. It is in the practice of this department of your art that you will reap your richest reward from a consciousness of sufferings alleviated, hearts gladdened, and duty done. Here too your path will lie much among the poor: and if indeed it is "more blessed to give than to receive"—to be the doers than the recipients of good—no calling should be more blest than ours; for none other enjoys such opportunities of adding to the happiness and relieving the suffering of the poor; and none avails itself more nobly or more constantly of its opportunities—"hoping for nothing in return." Familiarity with misery and suffering, with disease and death, will relieve you, indeed, from the painful feelings which they at first excite; but it will, at the same time, stimulate your benevolence and increase your power of doing good. "Let a man," says Bishop Butler, "set himself to attend to, inquire out, and relieve distressed persons, and he cannot but grow less and less sensibly affected with the various miseries of life with which he must become acquainted; when yet at the same time benevolence, considered not as a passion, but as a practical

principle of action, will strengthen : and while he passively compassionates the distressed less, he will acquire a greater aptitude actively to assist and befriend them." Such will, I trust, be your position in relation to the poor.

In curative as in preventive medicine, valuable information may be obtained from the experience of the people. Let me urge upon you the importance of examining into, as opportunity occurs, the very numerous remedies employed, sometimes undoubtedly, with success, by native practitioners. Little, I believe, has yet been done in this matter in comparison with what might have been and will be done. The credulity, absurdity and superstition, with which native therapeutics seems almost inextricably entangled, have obscured many useful truths ; and your leisure hours may be profitably spent in the endeavour to separate the nucleus of truth from the accretions of error and imposture. You will not think it necessary to investigate the therapeutical effect of a peacock's feather round a sick man's leg, any more than a western physician would be justified in testing the efficacy of infinitesimal doses, or of attempting to cure disease through the sense of smell. Besides, however, absurdities manifest as these, we could not *a priori* doubt, had experience not proved the fact, that the native practitioners of this country possess a knowledge not only of drugs, but even (perhaps) of modes of treatment of local disease worthy of your enquiry and study.

The third branch of the duties of our profession need not detain us long. As the first and second concern the preservation and restoration of human health, the third is concerned with the palliation of evils which we cannot prevent or remove, and the smothing of the inevitable path to the grave of those whose downward progress we have been unable to arrest. As it is our privilege to succeed more frequently than we fail in our efforts to restore the sick to health, and to cure our patients many times before the inevitable *once* which must come, sooner or later, to all, this department of our art is of less importance than the therapeutical, and I mention it only to remind you that so long as life remains, your duty to your patient lasts. Though "while there's life there's hope" is often but a broken reed on which the friends of the dying attempt in vain to lean, when to your eye no glimpse of hope is apparent, you can still do much to ensure a painless and a peaceful death.

On the subordinate duties of our profession, which are comprehended under the term "etiquette," much might be said, did time and place permit. The rules which regulate our professional intercourse with each other, with our patients and with the public, have been founded on the experience of centuries and are intended to promote, not our own selfish interests but the greatest good of all. In your professional conduct—as in all your conduct—act honestly

and firmly in obedience to the golden rule, "Whatsoever ye would that men should do unto you do ye even so to them," and you cannot transgress the unwritten code of medical etiquette. However keen may be the "struggle for existence" use no unworthy means to supplant your professional brother. Whisper no derogatory doubt of his skill—nor boast of your own superior knowledge. The choice of a medical attendant rests with the patient or the patient's friends alone. On you no responsibility lies if they choose unwisely; nor are you the most impartial judge of your own merits or rival's failings. That healthy emulation among members of our profession which stimulates us to exertions and results in benefit to ourselves and the community, becomes envy when it seeks to attain one's own elevation by the depression of another. From this grave breach of duty you will be preserved by strict obedience to the rule of which I speak.

Another of these duties which concerns not ourselves only but the whole community, is the avoiding of either the affectation or the reality of secresy with reference to the remedies we employ. There is no more striking or more honorable mark of distinction between us and the charlatans who infest civilization than that we invariably give the widest available publicity to every improvement in our art which we make or think we make: bringing its value to the test of discussion and experiment, and sharing its benefits, if established, with all mankind. The empiric preserves for his own sole advantages the secret whose value he exaggerates for his selfish ends. Each newly discovered truth which it may be our good fortune to extract from nature's mine is ours but at the moment of discovery, the next, it is offered freely to the world.

Of etiquette between physicians and patient, I shall mention but one most important rule. We cannot be too careful to maintain the strictest secresy with reference to the affairs of those who seek our advice. We necessarily, in many cases, become aware of fact and circumstances communicated to us under a seal as sacred as that of the confessional; which would not have been confided to us unless there were full assurance that the confidence *could* not be abused, and to divulge which would be a grievous breach of professional and personal honor. Exceptions may be imagined no doubt, but in practice you will meet with few. Accustom yourself to a belief that there are none and in those rare cases where doubt arises let your feeling—even your prejudice—be against admitting the possibility of exception. In this matter avoid even the appearance of evil. Resist the temptation not only to gossip about your patient's ailments, but even to mention unnecessarily the fact of his illness; or to talk of his affairs with which your position as medical adviser may give you more intimate knowledge, from the mere fact of your being more frequently than others at his house. I have

selected this example of the etiquette of the profession as between physician and patient, because I think it the most important, and that the strict observance of it is most essential to private happiness and public good.

In conclusion, let me urge you ever to remember that we belong—however subordinate or humble our position in the ranks may be—to an honorable profession—to a brotherhood devoted to the pursuit of truth, the preservation of human life, and the alleviation of human suffering. As a profession we have rights to claim no less than duties to perform. Those rights will be best maintained by scrupulous performance of our duties, and by cherishing a feeling of unity and *esprit de corps* amongst ourselves. Always be sensible that your individual short-comings have a tendency to lower the tone and reputation of the body to which from this day you belong. Firm in the consciousness of duty performed to the best of our ability, and of honorable union amongst ourselves, we should never claim in vain that which alone we ask—fair appreciation of what we do and suffer in staying the hand of Death—and relieving the pains and sorrows of our fellow-creatures, with kindly allowance for what we leave undone, through the weaknesses and failures which are incidental to the common lot of humanity.

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